PhD in Educational Effectiveness

School Effectiveness and Educational Evaluation in Greece

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Abstract

This study explores contemporary issues in the Greek educational system and presents the results of the first school effectiveness study in Greece. It is argued that the theory and research methods of Educational Effectiveness can initiate school self-evaluation and review. In the first two chapters, the readers are acquainted with the strengths and the weaknesses of the Greek educational system. Apart from basic educational statistics, four thorny issues are presented from an insider's point of view: (a) the lack of reliable educational statistics, (b) the lack of educational evaluation, (c) the 'shadow education' system of *parapaedeia*, and (c) the extreme politicisation. The author discusses the advances of educational evaluation from the Middle Ages until the post-modern era as well as the different meanings of 'quality' in educational discourse. Parallel comparative lines are drawn between Greece and other western countries as regards educational evaluation and quality. In the third chapter the readers are introduced to the notion of educational effectiveness and acquainted with the most recent developments in this field. The size, consistency and stability of school effects as well as the models, the theory and the criticisms of School Effectiveness are some of the issues discussed. In the fourth chapter, the author presents a number of statistical constructs (Factors) derived from Exploratory Factor Analysis. Four of these Factors are 'teacher's responsiveness', 'student's academic self-image', 'principal's effectiveness', and 'collegiality among teachers'. The fifth chapter presents the findings of the multilevel analysis. The normalised examination scores (21 subjects) of 30,573 students nested in 375 *eniaia lyceia* (senior secondary comprehensive schools) have been analysed with the help of linear and non-linear multilevel statistical models. It has been found that large *lyceia* have better results than small *lyceia* and that private *lyceia* have better results than state *lyceia*. However, the intra-school correlation coefficients are relatively small, ranging, on average, from 0.02 to 0.10. Students' previous achievement, socio-economic status, age, and sex are significantly correlated with later achievement. The 'shadow education' system of *parapaedeia* has a significant impact on certain academic outcomes. Students' views of teachers' responsiveness in the classroom are positively correlated with academic achievement. Though teachers are not satisfied with their salary and living standards, they have good relationships with their colleagues and find teaching to be an exciting job. Many students feel alienated in the schools, mainly because interpersonal relations are competitive. Finally, the condition of the school building and the behaviour of some of the teachers are the main reasons why many *lyceum* students would change their school. In the sixth chapter the author discusses the strengths and weaknesses of various quality indicators in education and argues that a decentralised framework for monitoring the quality of schooling could fill the gap of educational evaluation in Greece.

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Glossary

▪ CER (Centre for Educational Research)	*ΚΕΕ (Κέντρο Εκπαιδευτικής Έρευνας)*	The state foundation for educational research (mainly on assessment) in Greece
▪ DOE (Didaskaliki Omospondia Ellados)	*ΔΟΕ (Διδασκαλική Ομοσπονδία Ελλάδος)*	The union of primary teachers of Greece
▪ Direction of studies	*Κατεύθυνση Σπουδών*	Different programmes of specialisation in the Greek integrated *lyceia*
▪ EPEAEK (Epiheirisiako Programma Ekpedefsis kai Arhikis Epagelmatikis Katartisis)	*ΕΠΕΑΕΚ (Επιχειρησιακό Πρόγραμμα Εκπαίδευσης και Αρχικής Επαγγελματικής Κατάρτισης)*	The Operational Programme for Education and Initial Vocational Training. The purpose of this programme is the administration of the money that is provided by the European Community for the modernisation of the Greek educational system
▪ Factor (with capital F)	Linear combination of the original variables; Factors represent the underlying dimentions (contructs) that summarise or account for an original set of observed variables	
▪ *Frontisterio*	*Φροντιστήριο*	Greek word for the private lessons which take place in an organised way in specially equipped rooms
▪ *Idiaitero*	*Ιδιαίτερο*	Greek word for the private lessons that take place in students' homes on a one-to-one basis
▪ *Lyceum*	*Λύκειο*	Higher secondary school (ages 15 to 18)
▪ *Eniaio lyceum*	*Ενιαίο λύκειο*	The recently introduced comprehensive higher secondary school
▪ New Democracy	*Νέα Δημοκρατία*	The Greek Conservative Party – currently in the opposition
▪ OLME (*Omospondia Litourgon Mesis Ekpaidefsis*)	*ΟΛΜΕ (Ομοσπονδία Λειτουργών Μέσης Εκπαίδευσης)*	The union of secondary teachers of Greece
▪ *Parapaedeia*	*Παραπαιδεία*	The 'Shadow' education system of Greece (*frontisterio* and *idiaitero*)
▪ PASOK (Panhellenic Socialistic Movement)	*ΠΑΣΟΚ (Πανελλήνιο Σοσιαλιστικό Κίνημα)*	The Socialistic Party in Greece – currently in office
▪ PI Pedagogical Institute	ΠΙ *Παιδαγωγικό Ινστιτούτο*	An advisory body to the Ministry of Education (mainly in the area of curricula, textbooks and programmes of studies
▪ NSSG (National Statistical Service of Greece)	*ΕΣΥΕ (Εθνική Στατιστική Υπηρεσία της Ελλάδος)*	The National Statistics Agency of Greece

Prologue and Acknowledgments

> When I open a book, whether it is a narrative or not, I do so to have the author speak to me. And since I am not yet either deaf or dumb, sometimes I even happen to *answer* him (Gérard Genette, 1990: 102).

ON MY 16TH BIRTHDAY I was a student at the 1st General *Lyceum* of Elefsina and I remember that I had visited my friend Michael Fotiadis at his house. Michael was a very handsome boy and a natural-born basketball player. He also attended *frontisterion* after school and therefore he knew some topics in mathematics better than I did. Our mathematics teacher, Mr. Stavrides (not his real surname), was a brilliant mathematician but I always left his classes with many unanswered questions and many issues still unclear. It was not his fault though. How could he be expected to be effective with 33 students in a small class where the radiators were not working and the ceiling was trickling every time it rained? And how could students be expected to be motivated when the whole school building was shared between two schools? I remember that every second week I went to school in the evening instead of the morning because the students of the 2nd General Lyceum of Elefsina were having the 'morning shift'.

On the 1st of February it was my birthday and with a little help from my friend, I managed to understand the topics that I had not understood in Mr. Stavrides' class. Then Michael and I talked about Larry Bird – the 'greatest American basketball player ever' – and listened to some ballads of Kostas Hatzis – a Greek singer and guitar player. I thanked Michael's mother for the home-made sour-cherry juice, said hello to my friend and rode my father's bicycle. On my way home I stopped for a while to watch the sea because the sun was setting through the white clouds and the colours of the evening were beautiful. Four columns of white thick smoke were coming from the chimneys of my hometown's cement company, the 'Titan'. The smoke was rising peacefully straight up in the air like the fingers of a prayer, only to be scattered violently the moment it touched the clouds. The weather was getting stormy and the sea was getting rough. If my parents could afford sending me to *frontisterion*, as Michael's parents did, I would have some chances of becoming an electrical engineer and leave my hometown.

It is very difficult to explain what a *frontisterion* is. Actually, one will have to read this thesis in order to find out. Put briefly, however, *frontisterion* is the Greek 'umbrella' word for the extra

lessons offered outside the normal school hours. It was a commonly known 'secret', for example, that our mathematics teacher offered private *frontisterion* to groups of 3 to 5 students of his class just after his normal teaching hours in the school. My family could never have afforded these lessons. Some students were saying that Mr. Stavrides could be persuaded to offer a little extra 'push' to the grades of the students of his groups. These grades were of great importance for university entrance. Every body in the school knew Mr. Stavrides' private students. They knew that we knew. The normal hours in the school and the private hours in Mr Stavrides' after school 'lessons' were interlinked. However, nobody could do anything about it.

A few days after my 16th birthday, an earthquake of 6.6 points on the Richter scale hit the greater area of Athens. My school building was badly damaged. The officers of the local military airport were kind enough to put up large camouflaged tents for us in an open space near the school. These tents were now our new 'classrooms'. The students moved their chairs and desks under the tents while teachers moved the blackboards. Each blackboard was supported on two chairs. Under the tents, the teachers pretended to teach and we pretended to listen. In 1982, we were back at our school again and I did my best to revise for the final examinations. During the examination days I remember that there were police around the school. This was because national examinations needed to look reliable and fair. In the previous year the examination questions leaked to a number of *frontisterion* teachers. In 1982, I was wondering how in the world the police could possibly prevent a new leakage from within the system.

The final examinations in 1982 were not corrupted and one hot August morning I was listening to the radio in order to find out whether I would become an electrical engineer or not. The results of the national examinations were broadcast from the two existing national stations (in 1982 there were neither private stations nor laws for the protection of personal data). The fact that I am now writing this thesis indicates that I, like many others in my school, did not become an electrical engineer. The *numerus clausus* of the Greek universities, my cold class with the trickling ceiling, my teachers who secretly and unashamedly taught for money, and the fact that my school worked in two shifts are some of the excuses that I still make today in order to protect my hurt 'ego'. Yes, I never became an electrical engineer but it was not my fault. Yes, I could have become an electrical engineer if I could afford to be better prepared for the examinations. At that time, I didn't know the exact meaning of the phrase 'equality of educational opportunity'. I knew, however, the meaning of the word 'unfair'.

In the first days of the year 2002 the world is very different from the date of my 16th birthday. The development of computers and the Internet, the breakthroughs in biology, the disintegration of the 'eastern world', the AIDS epidemic, and the terrorist attacks in the United States are some of the epoch-making facts that my friend Michael and I wouldn't even have imagined back in 1981. However – and this is quite disheartening – Greek school system has not overcome the problems that my friend and I experienced many years ago. Last week I read to the *Ethnos* newspaper about a number of 16-

year-olds who took over their school because, as they said, 'heating is not adequate, the ceilings are trickling when it rains and the toilets are not being cleaned' (Triga & Nivolianitis, 2001). This situation is not unfamiliar. I looked at the faces of these students in the black and white photograph in the newspaper and I tried to understand their feelings. How do they feel when they go to school in the evening and not in the morning? How do they feel when they try to write on the blackboard wearing their gloves? Can their parents afford to pay for the *frontisterion* classes of today's equivalent of Mr Stavrides? I could not answer all these questions but at least I was satisfied that I had done a lot in order to write about these problems in the pages of my thesis.

If one had the time to read the present thesis, he or she would learn many interest things about the problems of the Greek secondary schools. The reader would then share the idea of the current author: the theory and research methods of School Effectiveness Research can help in the case of educational evaluation. As it will argued later, there is no one with the task of monitoring the quality of the educational system in Greece. In the 'secret gardens' of the Greek educational system, there are neither 'standards' to be achieved nor inspections to be carried out. In addition, the collection of educational data is rather uninsightful and slow. The publication of educational statistics is something that takes place occasionally. Like a steamboat without a compass, the Greek school system tries to find its route in the middle of a large archipelago. In fact that is how Odysseas Elytis, a Greek Nobel Prize winner for literature, described modern Greece in one of his poems: the 'loony steamboat'.

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Gérard Genette (1990), this prominent French theoretician in the area of narrative discourse, wants the author of a book to speak to him, regardless of this book being a narrative or not. Thus, the purpose of this prologue is to 'speak' to the readers in a more personal tone. From what has been already written, it is evident that the current thesis is based on a personal story. In fact, I believe that every thesis in the area of education is written by people who have something personal to say. In most cases, these people are teachers. I have read a number of doctorate dissertations and I bet that behind the standard academic expressions found in these theses (for example, 'more research is needed') lies the true heart of every author. Of course, there are successful PhD dissertations without this internal narration, as there are personal stories which will never find an open door to academia. Therefore, I think that I was lucky enough to be allowed to say what I wanted to say. Researchers are supposed not to know their findings in advance but when I started my research, I knew exactly what I wanted to find and where to find it. My supervisors and the other friends at the London Institute of Education helped me to tell my story in an academically acceptable way. In other words, they have transformed me from a storyteller to an academic writer. Very honestly, I would like to declare that I only tried to put my personal views on paper using mathematical models and plain English language. For the latter,

I must apologies to native speakers for my relatively poor command of this beautiful language. Thus, among the mathematical models that are presented in this work, the reader will probably find a personal plea among the lines. Let me give an example of this personal plea by quoting a paragraph from the sixth chapter of the current thesis.

> The situation that was described in the previous paragraph has to change if Greece is ever to improve the quality of its educational system. If a 'second chance' is to be given to those secondary school students whose level of achievement in June is low, policy makers have to make sure that this 'chance' is being offered by the schools themselves and not by *frontisteria*. A 'second chance' that depends on the family's income is not a chance at all. In current author's opinion, such a policy deeply insults the image of the Greek educational system in the eyes of teachers, students and parents. After all, Greek people pay their taxes in order to enjoy an effective and just educational system. In the current study, some elementary statistical models showed that attendance at *frontisteria* raises the chances of success, especially in subjects where procedural and not declarative knowledge is being pursued (such as Mathematics and Science). Future research has to open the 'black box' of *parapaedeia* in Greece whereas future educational policy has to eliminate the parasite of *parapaedeia* forever.

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There are many people to whom I am indebted for the writing of this thesis. Firstly, I owe a lot to Professor Pamela Sammons, my supervisor at the London Institute of Education for her guidance. A supervisor's work is not only to offer his or her experience and knowledge. The difficult part of his or her work is to harmonise a candidate's own abilities with the academic standards. Supervision is an art. It takes heart to do it and I am sure that Professor Pam Sammons has put some of her heart into my work. She believed in my thesis and, as I have told her in person, she gave me more than a student could expect from his supervisor. I should also not forget the contribution of Dr. Sally Thomas, now at Bristol University, who jointly supervised me at the London Institute of Education with Professor Pam Sammons in the first stages of this work. Ms Karen Elliot has also been a good friend. The door of her office was always open and it was a great experience to see a trained statistician like her produce the type of work which is still being regarded as *avant garde* in my country. Thanks are also due to the people at the London Institute of Education who offered courses in statistics and multilevel modelling.

I am also grateful to two Greek academics who though not involved in this study were for me a source of help. Associated Professor Nikos Andreadakis from the University of Crete was my teacher at Marasleion College in the field of Educational Research Methodology. Though our teacher-learner relationship has officially

ended I am lucky because he has remained my critical advisor and friend ever since. The most important thing that I have learned from him is that reading about educational research in the books is one thing; doing educational research in the real world is another thing. I am also grateful to Professor Elias Matsagouras from the University of Athens for taking me into his office at a time that I could not afford to continue my studies in London as a full time student. I learned a lot working with Professor Matsagouras because in my opinion he is one of the most prolific Greek authors in the field of didactics and – I must say – a fair person.

I must also thank the Greek State Scholarships Foundation (SSF) for providing the necessary funds for my studies in the United Kingdom. The people who work at the SSF do their best to give to those who cannot afford to study for a higher degree the chance to do so. I think that the next step for the people in the SSF is to change their regulation to allow students from poor families to study at Oxford and Cambridge. Professor Michael Vamvoukas, who was appointed by the SSF to act as my supervisor, is regarded as the Greek expert in the field of educational research methodology. His reports to the SSF regarding my progress were excellent. I am proud for having satisfied this 'difficult' but fair researcher. Thanks are also due to Dr Anastasia Kostaki from the Greek Pedagogical Institute and Mrs Anastasia Pashalidou from the Ministry of Education (Department of Secondary Schools Studies) for providing the necessary permission for school-based research. At the administrative level, thanks are also due to the head of my local educational authority Mr. Vasilios Koutas for allowing me to leave my teaching post during my studies.

I would like to thank one person as a representative of all the teachers who helped this study either by participating, or by voluntary help in the collection of the data. Mr. Paul Haramis, the secretary of the Centre of Studies and Documentation (KEMETE) within the Greek Secondary Teachers Union (OLME), presented my thesis to the heads of this powerful organisation. At a time when all teachers were very suspicious of the word 'evaluation', I was able to go to the schools and claim that my study had been approved by the Union. Special thanks are also due to Dr John Karanikas (a physicist and school consultant) and Mr. Kostas Arvanitakis (a physicist and PhD candidate) for their advice on secondary education.

I would like to close this prologue by thanking the people I value most. 'There are no victories in all our histories without love' are the lyrics of a song that I used to play in my study room and there are many people who provide love in my life. My wife Georgia, my daughter Katerina, my mother Katerina, my parents in law Argyro and George Markeas, and my brother Anastasios have always been near me both physically and mentally. My wife helped me a lot by listening to my ideas with a clear mind and giving her opinion. George Markeas, my father in law, helped me in the preparation of the questionnaires (printing, binding, and storing). Finally, I cannot find words enough to say how much I miss now my father, Nikos Verdis, who passed away one year ago. He never lost his sense of humour. This work is dedicated to him.

1. INTRODUCTION: A SCHOOL EFFECTIVENESS STUDY IN GREECE

"It is an exciting time to be involved in educational research".

Tony Townsend (2001) Satan or saviour? An analysis of two decades of School Effectiveness Research. *School Effectiveness and School Improvement* (vol. 12, part 1, p. 115-129).

WHILST IT WOULD BE UNREALISTIC TO CLAIM THAT THERE ARE NO OTHER works dealing with effective pedagogues in Greece, it would not be unrealistic to argue that the present work is essentially the first Greek school effectiveness study. In other words, it is the first time that a Greek study addresses to the international community of school effectiveness and improvement. As it will be argued later in this work, there is nowadays an international community of researchers who study effectiveness in education. These researchers see education through certain epistemological lenses and recognise a number of factors which influence the quality of educational systems. Most of these researchers use certain methodological tools, meet at annual congresses for 'school effectiveness and school improvement' and, although they may have different interests, are aware of their common historical and theoretical roots. Within this lively international community, there are many influential books, journals, and reports. From time to time, researchers who belong to the school effectiveness and improvement community answer their critics as there are books and articles which resist both the idea of educational effectiveness and the methods by which this idea is developed. All these issues will be discussed later in this volume. What is important to state here is that the present thesis would be better understood from the perspective of those who are aware of the school effectiveness and improvement knowledge base.

What is also important to stress in this introductory chapter is the reason for which the current work has focused on the organisational effectiveness of the Greek higher secondary school, the *lyceum*. The answer is that the present work hopes to contribute to the evaluation of 'educational work' and the improvement of the Greek educational

system. In other words, this thesis will attempt to bring together 'effectiveness' and 'evaluation'. This combination is not uncommon. 'Effectiveness' is a broad term in education. There are studies on 'effectiveness' which focus on equality of opportunities and the significance of the school in this; the evaluation of compensatory programmes; the effectiveness of teachers, classes and instruction procedures; the economic aspect of education, and the educational production functions. All these aspects of effectiveness will be discussed in the thesis.

The association between school effectiveness and educational evaluation is not difficult to establish. Hill (1995) has argued that school effectiveness is concerned with measuring the quality of schools and of understanding the characteristics of those schools in which students make greater progress than would be expected from a consideration of their intakes. If, however, we could measure the quality of the schools or assess the extent to which they achieve their goals, as Hill (1995) suggests, we could use this information in order to evaluate the different aspects and processes of schooling. Moreover, if we could understand more about the characteristics of those schools in which students make greater progress than would be expected from a consideration of their intakes, we could design and evaluate our own policies and interventions. If schools in Greece can be shown to 'make a difference', as in other educational contexts, it would be important to understand these differences, measure them and comment on them. The application of the methods and the knowledge base of school effectiveness could provide Greek teachers with a powerful stimulus for developing school self-evaluation, review and improvement. Of course, in every evaluation there are dangers. Brown (1994) warns that there is always the danger that the findings on the school effect to be used by politicians for 'summative' evaluations and accountability. However, policy makers and journalist in Greece will use the summative function of school results in any way. It is essential therefore for the teachers to have their own proposals.

Educational evaluation disappeared from the Greek educational agenda in the early 1980s. Until then, the evaluation of teachers had been the job of school inspectors whose reports – as most people in Greece agree today – constituted the tools with which political control was exerted over education. Inspection reached its heyday during the military regime in Greece between 1967 and 1974. In the early 1980s, teachers' reactions and the socialist government's efforts towards democratisation resulted in the abolishment of any inspection and the introduction of the body of school consultants.

School consultants only provided pedagogical guidance and support to teachers. It is important therefore to note that for twenty years now there has been nobody in Greece with the task of evaluating the quality of education from kindergarten to university.

Until now, nobody has been able to write about the relative effectiveness of Greek schools. Kallen (1996) in a report about the condition of secondary education in Greece gave the following two explanations for why this is the case: (a) there is no adequate mechanism for data collection and analysis in Greece and (b) there is no culture for educational evaluation in Greek schools. Today, eight years after Kallen's (1996) remarks, little has been changed regarding the collection of educational statistics and the evaluation of the Greek school system. A study conducted by the Greek Pedagogical Institute regarding the evaluation of so-called 'educational work' was terminated in 1999 due to changes in the government's educational policy. Another study undertaken by the Centre for Educational Research concerning the 'investigation of the characteristics of the Greek schools' is still in its pilot phase. It is important to stress that 75% of the funds for these studies come from the Second Support Framework of the European Community. The aim of the current researcher is thus to investigate whether a self-financed work could be a model for other educational researchers in the Greek Pedagogical Institute or the Centre for Educational Research. The basic purposes of the current study is (a) to investigate the size, the structure and the correlates of school effect in Greece and (b) to use the knowledge base that will be created from this investigation as a theoretical and methodological framework for developing approaches to educational evaluation.

The purposes of the current researcher may sound unremarkable in the ears of those who work within the school effectiveness and improvement community. This is because in most European countries there are systems for educational evaluation. Reliable educational statistics are published on a regular basis. Also in most European countries there are people – usually called 'school inspectors' – who visit the schools in order to evaluate the work of the teachers, the use of the resources, and the processes of teaching and learning. The situation in Greece is dramatically different from that of the other European countries. No mechanisms for monitoring the quality of education exist, no educational statistics are published, and no inspectors visit the Greek schools. Greece participated in the Third Mathematics and Science Study (TIMSS) as well as the Programme for International Student Assessment (PISA 2000). Results regarding the place of Greek students in these two studies can be found in the official OECD

publications. However, no further analyses have been made or published focusing on the Greek educational system.

Plans for educational evaluation were recently introduced by the previous Minister of Education, Dr. Gerasimos Arsenis, in the eighth article of educational Law 2525 of 1997. However, this article was never enforced in response to teachers' adverse reactions, lack of the necessary infrastructure and expertise, and lack of the supporting presidential decrees. The current Minister for Education who succeeded Dr. Arsenis, Mr Petros Efthimiou, has essentially abolished the eighth article of the Law 2525 and is preparing his own proposals for educational evaluation. Some basic ideas from Mr. Efthimiou's plans are presented in the sixth chapter of the current thesis but up to the day when the present work was submitted, the details of the new procedures for educational evaluation were unknown. Therefore, there are now three different published proposals for educational evaluation in Greece: (a) a proposal made by teachers in the 1980s, (b) the proposal made by the Greek Pedagogical Institute in 1999, and (c) the eighth article of Law 2525 of 1997 that was passed by the previous Minister.

Fitz-Gibbon (1996b) has written that monitoring the outcomes of any educational system is a procedure heavily dependent on the availability of the necessary data. When the present study began in 1998, the most important problem was the scarcity of educational statistics. Even in the cases where tables with summative statistics did exist, the access to them was extremely difficult. The people at the Centre for Educational Research, the Ministry of Education and the Educational Department of the National Statistical Service of Greece prompted the current researcher to seek tables with educational statistics in the annual OECD publications. Actually, there are no standard ways in which a researcher can ask state organisations in Greece to supply him or her with educational statistics. This is quite disheartening. Dissemination of information can be seen as a basic ingredient of democracy, whereas unavailability of information should be considered as undemocratic as censorship. From that perspective, a lot needs to be done in Greece. Let us see how a team of OECD inspectors has described the collection of educational statistics in Greece:

> The collection and processing of statistical data in Greece are mainly the responsibility of the National Statistical Service of Greece. However, according to the Background Report, the Agency, due to lack of resources, is about *ten years behind* in its collection of data on education. The Statistical Unit in the Ministry of Education seems to suffer from a similar shortage of resources. *A chaotic*

> *and wasteful network of data collection within and outside the Ministry* (the Pedagogical Institute also collects its own data) has resulted (...). A strong relevant recommendation from the UNESCO International Institute for Education Planning (IIEP) was not followed up and it seems that the situation has since (*i.e.* the mid-1980s) further deteriorated. We were able to see for ourselves on the spot that *essential data were not available* and that on many matters widely diverging data were being used. This state of affairs represents a serious handicap to educational policy making and management (OECD, 1997: 164, italics added by the current author).

Greek policy makers are well aware of the situation described in OECD's quotation. Therefore, Greeks are discussing the need for the establishment of a 'committee for the co-ordination of statistical information and questionnaires'. The OECD inspectors wrote in their report in 1997 that 'we strongly recommend that the discussions [for the above mentioned committee] be carried out as rapidly as possible and that pertinent decisions be taken and implemented without delay' (p. 165). However, so far, the committee for the co-ordination of statistical information and questionnaires has not been established.

As was stated at the beginning of the current chapter, the present study will focus on the integrated *lyceum*, the upper secondary comprehensive Greek school (ages 15 to 18). The underlying idea of the study is that Greek *lyceia* differ to a significant degree in their impact on a number of cognitive and affective outcomes. A first step thus will be the measurement of the differences between schools with the help of statistical models. In a second step, the researcher will try to propose a model of *lyceum* effectiveness and a framework for monitoring the quality of secondary education in Greece. The research questions of the current study could be posed as follows:

1. Are the *eniaia* ('integrated' or comprehensive) *lyceia* in the prefecture of Attiki equally effective in terms of their students' academic outcomes?
2. Are *eniaia lyceia* in Athens equally effective in providing their students with information about four important social issues[1]?
3. Are *eniaia lyceia* in Attiki consistently effective for different academic outcomes?
4. If *eniaia lyceia* in Athens are not equally or consistently effective what measures and school processes may help to explain their differences?

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[1] These issues are the sexually transmitted diseases, drugs, minorities, and vocational orientation.

Strongly associated with these four research question are the two following issues:

1. How could the answers to the four research questions of the current study contribute to the development of a model of *lyceum* effectiveness in Greece?
2. How could a theoretical model of *lyceum* effectiveness contribute to the case of educational evaluation and school based review in Greece?

Having presented the rationale and the research questions of the thesis it is now time to introduce the readers of this work to the Greek educational system. For the needs of this brief presentation, a collection of laws and presidential degrees will be outlined. Teachers' perspectives will also be approached through their unions' publications. Before closing this first introductory chapter it is important to stress that like many other areas in education, this thesis is a mosaic of pieces from different disciplines: pedagogy, philosophy, psychology, statistics, educational evaluation and assessment, educational policy, and organisational theory. Elements of educational policy and evaluation can be found in the second chapter of this work; educational effectiveness and organisational theory are discussed in the third chapter; finally, philosophical and statistical issues are presented in the fourth chapter.

2. QUALITY, EVALUATION, AND MODERNISATION IN THE GREEK EDUCATIONAL SYSTEM

"The problem of the Greek educational system becomes more intense as 1992 approaches. In competitions among the educational systems, Greece lags behind. Tomorrow, in the united Europe, all the opportunities, all the possibilities and all the benefits will belong to the others, because they will be better qualified and better prepared to cope with the emerging problems. If we do not stop going backwards, we will be providing the European market with low-level personnel in jobs requiring merely mechanical skills and not creative work".

Current Prime Minister of Greece Konstandinos Simitis in the newspaper *Το Βήμα* [*To Vima*] on 10 December 1989. Title: 'Τα σχολεία μας παράγουν μικροκαπιταλισμό και κρατισμό' [Our schools produce micro-capitalism and statism].

2.1. THE GREEK EDUCATIONAL SYSTEM

2.1.1. LOGISTICS AND BASIC FEATURES

Greece is a county in the south east of Europe and member of the European Community. Due to the lack of detailed published national educational statistics in Greece, most of the figures that will be presented in this chapter have been derived from international publications, especially the publications of the Organisation for Economic Co-operation and Development (OECD). OECD has commissioned and published four reports on the Greek educational system: the first in 1961, the second in 1965, the third in 1979 and the fourth in 1997. The latest report (OECD, 1997) identifies four basic features of the Greek educational system. Firstly, Greek education serves a traditionally highly homogeneous society, sustained by its deep-rooted Hellenic and Byzantine traditions, by a cohesive, state-supported religion, and by a strong family solidarity. Secondly, education in Greece operates within a context of great geographic contrasts and variety, with corresponding differences in the distribution of population between urban and rural areas, as well as great socio-economic differences between these two areas. School buildings space in towns is hard to find while schools in rural areas are regarded as functioning at high cost. Thirdly, education in Greece has never connected with the world of work. This is because by serving a traditionally agricultural country, Greek economy shifted rapidly from the primary production sector to a secondary and tertiary level. Fourthly, as it will be explained in the following sections, education in Greece is extremely politicised. Politicisation is logically a characteristic of centralised educational systems because in these systems the teachers and administrators are directly accountable to the governments. Few other countries, however, have experienced the extent of educational discontinuities that Greece has suffered as a result of political turmoil in the post War period.

The Greek school system has a rather simple and clearly delineated structure. Its compulsory part consists of six years of primary school (*demotiko scholeio*), followed by a three-year comprehensive lower secondary school (*gymnasio*) After *gymnasio*, most students continue their studies to the higher secondary school, the *lyceum*. Until

1998 there were five types of *lyceia*[1]: (a) 'general' *lyceum*, (b) 'technical' *lyceum*, (c) 'polyvalent' (comprehensive) *lyceum*, (d) 'classical' *lyceum* (focusing on the study of classics), and (e) 'music' *lyceum* (offering studies – but not certificate – in music). Starting from 1998, however, all types of *lyceia* that were described above (except for the music ones) became *eniaia i.e.* 'integrative' or comprehensive. The passage from the situation in which many types of *lyceia* existed to the establishment of 'integrated *lyceum*' will be explained later. The structure of the Greek school system is presented in Table 2.1 (source OECD, 1997).

Table 2.1. The structure of the Greek school system after the 1998 educational reform.

Level	Institution
Primary	Pre-primary: Kindergarten: usually two years (ages 4-6)
	Elementary School: six years (ages 6-12)
Secondary	Lower secondary school (*gymnasio*): three years(ages 12-15)
	Upper secondary school (*eniaio lyceum*): three years (ages 15-18)
Tertiary	University (ages 18+)
	Non-university tertiary education

Tables with educational statistics are not published in Greece on a regular basis and therefore those who are involved in educational research have to visit the National Statistical Service of Greece (NSSG) and ask for information on a personal basis. However, even a personal visit to the NSSG cannot guarantee useful statistics. This is because the statistical tables of the NSSG contain only general information, usually summated at country level. Such national statistics are provided annually by the NSSG to international organisations like the OECD, Eurostat and UNESCO. Regional educational statistics or statistics of special national interest are not published regularly and the time that passes from the collection of the data until their presentation in the library of NSSG is about six years. In January 2002, the NSSG presented the first statistical tables of 1996.

For the reasons that were stated above the current author will present Greek educational statistics as they can be found in international publications. These statistics are

[1] *Lyceia* is the plural for *lyceum*.

published and therefore their accuracy can be verified. The statistics that will be presented in the current section have been taken from the latest publication of *Education at a Glance* (OECD, 2001). In the current chapter two kinds of statistics will be used: (a) those dealing with the attainments of the Greek population – a piece of information that will be used later in Chapter 5 – and (b) those dealing with the extent of the public and private investments on education.

Table 2.2 presents the educational attainments of the Greek population (21-64 years of age) by the highest level of attainment achieved (source OECD, 2001). The numbers in the cells are percentages. The abbreviation ISCED stands for the International Standard Classification of Education in its latest revision in 1997. Explanations for the various levels of ISCED can be found in the Appendix (p. 352). It can be seen that the percentage of Greeks who only hold a certificate from primary school is very high compared to the OECD mean. In addition, the difference between Greece and OECD country mean in the ISCED-3B column indicates that not many Greek students hold a degree from a technical secondary school.

Table 2.2. Percentages for the educational attainment of the Greek population (source: OECD, 2001).

	(1) pre-primary and primary	(2) Lower secondary	(3) Upper secondary		(4) Post secondary non-tertiary	(5) Tertiary type-B	(6) Tertiary type-A
	ISCED 0/1	ISCED 2	ISCED 3B	ISCED 3A	ISCED 4	ISCED 5B	ISCED 5A/6
Greece	41	9	4	23	5	6	12
OECD countries mean	16	20	15	21	3	8	14

Note: The sum of the percentages for OECD countries does not add up to 100 because not all the possible types of upper secondary education are presented in the table.

In Table 2.3 the educational attainment of the Greek population is presented by gender and age group. The gender disparity, especially for the over 35 age groups, can be seen both in Greece and the other OECD countries in the case of secondary education. The same phenomenon can be seen also in the case of tertiary education.

Table 2.3. Educational attainment of the Greek population by gender and age group (source: OECD, 2001).

		At least secondary education					At least tertiary education				
Age		25-64	25-34	35-44	45-54	55-64	25-64	25-34	35-44	45-54	55-64
Greece	M	52	69	59	47	30	20	22	24	20	12
	W	48	73	57	38	19	16	28	18	11	5
OECD country mean	M	63	72	66	60	51	23	25	24	22	17
	W	58	72	63	53	39	21	27	23	18	11

Note: 'M' indicates 'men'; 'W' indicates 'women'.

According to the latest OECD report (2001) the expenditure on educational institutions (all levels of education combined) as a percentage of total public expenditure is for Greece 6.9; the public expenditure on education as a percentage of Gross Domestic Product (GDP) is 3.5 (see Table 2.4). The corresponding mean values for the OECD countries are 12.9 and 5.3 respectively. The percentage of public expenditure for primary, secondary and post secondary non-tertiary education for Greece is 4.6, almost half from the OECD mean of 8.7. Moreover, the public expenditure for primary, secondary and post secondary non-tertiary education as a percentage of GDP is for

Greece 2.3, a figure much lower from the OECD countries mean of 3.6. It seems therefore that less public funds are dedicated in Greece for education in comparison with the OECD countries mean.

Table 2.4.Total public expenditure on education as a percentage of total public expenditure (from OECD 2001: 100).

	Public expenditure on education as a percentage of total public expenditure			
	1998			1995
	Primary, secondary and post secondary non-tertiary education	Tertiary education	All levels of education combined	All levels of education combined
Greece	4.6	2.1	6.9	5.2
OECD country mean	8.7	3.0	12.9	11.9
	Public expenditure on education as a percentage of GDP			
Greece	2.3	1.1	3.5	2.9
OECD country mean	3.6	1.3	5.3	5.4

Another aspect of the low percentage of GDP dedicated to education for Greece is the expenditure per student. Table 2.5 presents the expenditure per student by level of full-time education. The figures in the cells have been transformed using PPP: the Purchasing Power Parity (PPP) exchange rates. PPPs are the rates of currency conversion which seek to eliminate the differences in price levels among countries.

Table 2.5. Expenditure per student (1998) in US dollars.

	(1) Pre-primary	(2) Pri-mary	(3) Lower secon-dary	(4) Upper secondary	(4) All sec-ondary	(5) Post Secon-dary non-ter-tiary	(6) All Terti-ary
Greece	x(2)	2368	x(5)	x(5)	3282	2773	4157
OECD country mean	3585	3940	5083	5916	5294	4404	9063

Note: x indicates that the data are included in another column. The column of reference is given in brackets after x.

The data that were presented in Table 2.4 and Table 2.5 suggest chronic under-funding of the Greek educational system. However, according to OECD (2001), the direct and indirect expenditure from public and private sources on primary, secondary and post

secondary non-tertiary education is for Greece 3.5, a figure very near to the OECD countries mean 3.7. As there are not mechanisms for public subsidies to the private education in Greece – in the entry for 'Greece' the OECD (2001) report uses the letter '*n*' for 'negligible' (p. 107) – it can be concluded that the distance between the initial 2.3% and the final 3.5%, as percentages of the Greek GDP that is dedicated to education, is covered by households. Indeed, according to one recent publication from the Council of Europe (Kallen, 1997), the total expenditure of the Greek households for education amounted in 1994 to one third of their overall expenditure. This figure includes the costs of the Greek undergraduates and post-graduates students who study at foreign universities. In the years 1992 and 1994 the numbers of Greeks who were studying abroad were 28,380 and 29,231 respectively (OECD, 1997). The most preferable destination is United Kingdom. In conclusion, because education in Greece suffers from severe lack of resources, the cost of schooling has been transferred to the households. Although Greece does not fall short from the other OECD countries as regards the total percentage of the GDP for non-tertiary education, Greek parents have to indirectly provide a large part of the cost for the education. This fact is a source of inequality.

In terms of the position of the teaching force, Greek primary teachers receive a thorough pedagogic training in the universities. By contrast, secondary teachers who teach in secondary education (*gymnasia* and *lyceia*) are subject specialists with very little pedagogical training. Until very recently, Greek teachers were appointed to schools through an official waiting list that was based on seniority, known as *epetirida.* The average waiting time for appointment through *epetirida* was 10 years. In 1988 however, objective and centrally steered selection examinations replaced *epetirida.* This policy met very strong resistance from the teachers. After their appointment, Greek teachers are civil servants. They are never laid off – except for cases of extreme offences – and they are not allowed to have any other occupation apart from teaching. Teachers' promotion and progression in salary is entirely depended on seniority. Seniority is also the only formal criterion for the selection of school principals or *diefthintes* (directors), as they are called. OECD observers correctly noticed, however, that in practice political considerations play a large role in the appointment of *diefthindes* and that any change in government leads to a massive replacement of school directors and other administrative personnel in education (OECD, 1997). This illustrates the important political dimention in the Greek educational system.

2.1.2. The administration of Greek schools

The Greek educational system has always been centralised and bureaucratically organised. All decisions pertaining to curricula, textbooks, school timetables, the appointment, salaries and promotion of teachers, the establishment, equipment and operation of the schools, are made by the Ministry of Education and are uniformly introduced into all the schools. Figure 2.1 presents the administrational pyramid of the Greek educational system. The Greek Ministry of Education is at the top. The Pedagogical Institute and the National Council for Education act as advisory bodies to the Minister. The National Council for Education has a small secretariat but it has hardly ever held any meetings. Another advisory body to the Minister is the Centre for Educational Research (it does not appear in Figure 2.1), which should be regarded as being on the same level as the Pedagogical Institute and the National Council for Education.

Kassotakis (2000) describes the small steps that were introduced towards decentralisation of the Greek educational system with Law 1566 of 1985. Through this law, a proportion of public subsidies is now allocated and administered at local level. In addition the same law provides for the participation of local authorities and representatives of social bodies in educational committees functioning at school level as well as regional and national levels (*op. cit.*). The steps towards decentralisation, however, have been very small. The Greek educational system retains its centralised character. The schools in every Greek prefecture are administered by educational directorates which are different for the primary and secondary level. There are 108 educational directorates in the 54 prefectures of the country. In some densely populated prefectures, there are also education offices, which come under the education directorates. The role of the heads of the directorates and the offices is the supervision of the functioning of the schools. However, the heads of these two local education authorities have very limited authority over the teaching staff, the school buildings, and the curriculum.

The lowest level in the Greek educational pyramid is the school. Greek schools are governed by the school director[1] who is assisted by a deputy director. However, both the

[1] In some English texts, the Greek school director is translated either as 'headteacher' or as 'principal'. In the current thesis, 'director' is thought to be a better translation for the Greek word '*diefthintis*'.

director and the deputy director do not have any authority over the teaching staff, the students and the curriculum. Until now their only work has been to keep teachers informed about the circulars issued by the Ministry of Education. In fact, all the minor decisions in Greek schools are taken 'democratically' by the teaching staff. The teachers hold special sessions every few days in order to decide the policy of the school. The policy issues that have been left by the Ministry to be decided at school level mainly regard issues like the action that is to be taken to deal with students' disciplinary problems, the visits to museums, and the organisation of athletic and musical events. Thus the autonomy of Greek schools is limited. Teachers who have been selected by the Ministry of Education to act as school consultants visit the schools and offer advice and help concerning educational problems but they do not evaluate either the school or the teachers. School consultants are appointed for four years and their appointment is subject to renewal. Ever since their introduction in the early 1980s their role in the Greek education system has remained unclear.

Another aspect of special importance in the Greek secondary schools is the participation of students in the administration of the school. Educational Law 1566 of 1985 introduced student participation in decision making through the 'school communities' which now exist in every *lyceum* (higher secondary school). School communities have been introduced mainly for educational purposes. It is thought that increased participation in decision making at school will make today's democratic students tomorrow's democratic citizens. School communities seek to promote collaboration among students, emphasise freedom of expression, and encourage the flow of ideas. In fact, however, this role of the school communities has been marginal. There are two other administrative groups at school level: the school council and the school committee. The role of the former is to build up good relationships and foster links between teachers and parents. The school committee is responsible for fund-raising activities and the operational expenditure of the school (apart from teachers' salaries). Both the school council and the school committee are presented in Figure 2.1.

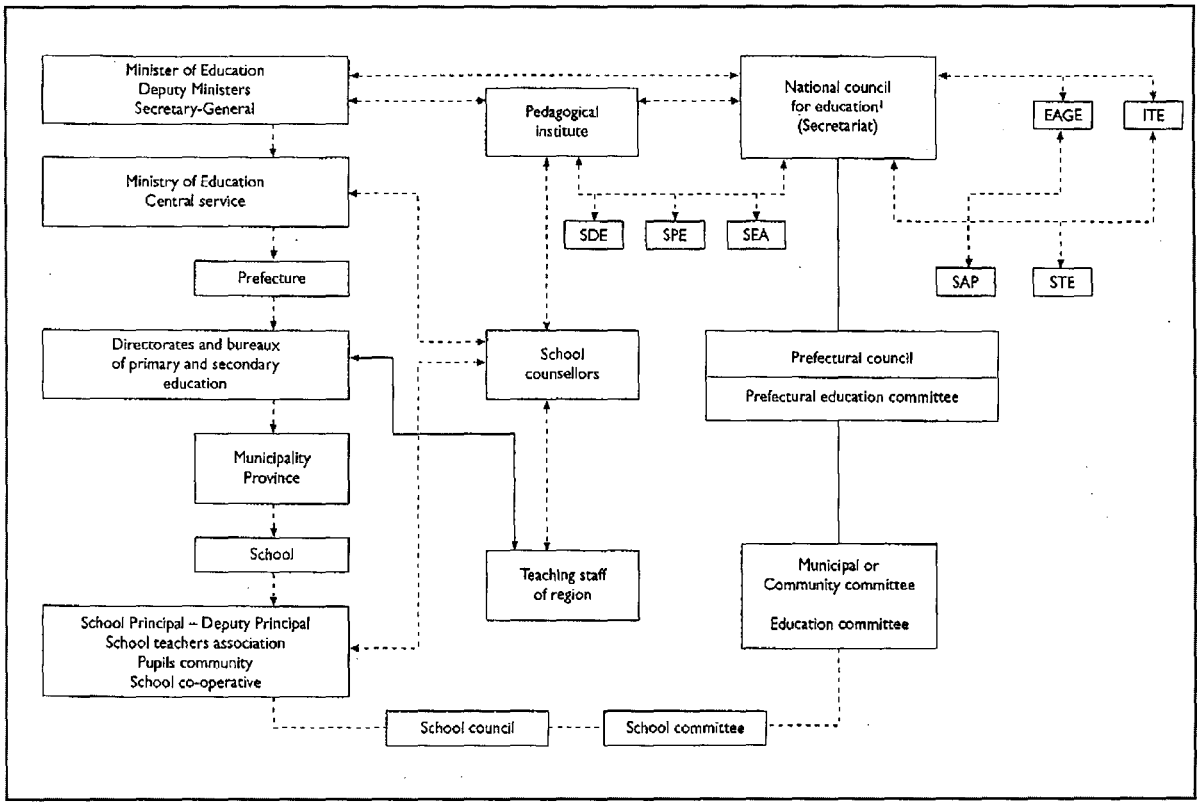

Figure 2.1. The organisational structure of the Greek educational system (source OECD, 1997).

2.1.3. THE *FRONTISTERION*: THE GUILTY SECRET OF THE GREEK EDUCATIONAL SYSTEM

One of the most important features of Greek education is the existence of the *frontisterion*: the private institutions which offer extra hours of private tutoring in specific curriculum areas. Sometimes private tutoring takes place at the student's own home on a one-to-one basis. In that case, the *frontisterion* is called an *idiaiteron* (private) *frontisterion*, of simply an *idiaiteron*. Thus, the *frontisterion* and the *idiaiteron* (*frontisteria* and *idiaitera* in the plural) are the two forms of the Greek 'shadow educational system'. This study found that about 78% of the students who participated in the study attend a *frontisterion* and that 30% have an *idiaiteron*. Moreover, 18% of the students who participated in the current study use a combination of *frontisterion* and *idiaiteron* in order to compensate for the poor quality of teaching in schools. These figures do not include some 'extracurricular' activities like foreign languages or music.

The term '*frontisterion*' is derived from the Greek verb '*frontizo*', which means 'to look after something' or 'to take good care of something or someone'. Private tutoring can be found in other educational systems as well. In Japan, for example, the private tutoring system of the *juku* is an essential part of the public education system. Nowhere, however, is the extent of this phenomenon so great as in Greece where *frontisteria* and private lessons are being generally called *parapaedeia*. The word *parapaedeia* derives from '*para*' (lateral) and '*paedeia*' (education) and signifies a 'shadow' educational system. The reason why Greek families have to 'look after' of their children's studies is that the quality of educational work in the state schools is perceived as poor. Moreover, it is believed that in the last stages of higher secondary education Greek state schools do not make enough to prepare the students for the university entrance examinations. Many parents therefore send their children to evening classes, in which they are often taught by the same teachers who teach in their schools. This fact reveals the extent of the inadequacies of the public educational system. Some information about the shadow educational system of the Greek *parapaedeia* is presented in Table 2.6.

Table 2.6. The Greek system of *parapaedeia* (shadow education).

In Greek	Pronounced	Meaning
Παραπαιδεία	*Parapaedeia*	The notion of lateral (shadow) education in Greece in the form of *frontisterion* and *idiaiteron*
Φροντιστήριο/α	*Frontisterion(n)* (*frontisteria* in plural)	Evening private lessons that take place in an organised way in specially equipped rooms. *Frontisteria* target groups of students and offer extra help with everything that is being taught in schools during the day. Most *frontisteria* have been recognised by the Ministry of Education.
Ιδιαίτερο/α	*Idiaitero(n)* (*idiaitera* in plural)	Evening private lessons that take place in students' homes on a one-to-one basis. *Idiaiteron* is a covert activity and no receipts are issued. For a teacher to offer private lessons to the students of his or her class is officially prohibited (especially in the case where the same teacher assesses his or her student's homework the next morning in school). One year ago legal *frontisterion* owners presented to the Minister of Education a large list with the names of teachers who offered illegal *idiaitera* (personal communication). No action has been taken against these teachers.

Frontisteria can cater for every educational area but most of them focus especially on Science, Mathematics, Ancient Greek Language and essay writing. By far, the most

profitable *frontisteria* are those offering classes in foreign languages. Greek students are taught at least one foreign language (usually English) in their schools but the quality of teaching is regarded as so low that languages other than Greek are exclusively taught in *frontisteria*. As for the subjects that are completely missing from the Greek National Curriculum, other private institutions have taken every opportunity to benefit from the inefficiency of the state system. For example, students who are talented in music, have an artistic inclination, or wish to take on athletics, have to turn to the private sector after the normal school hours because, essentially, courses in music, fine arts and physical education are not offered in Greek schools. After the normal school hours, which are usually from 8:15 a.m. to 1:30 p.m., Greek students start their shadow education marathon. The 'race' is not over until late at night. According to PISA 2000 Greek students have the largest amount of homework among all the other OECD countries (see OECD, 2001: Figure 7.6)[1]. The funds for all this highly profitable activity come directly from Greek households. Thus the inequalities between Greek households are directly transformed into educational inequalities. That is how Manolis Dretakis (2001), an academic in the field of Economics and former socialist Minister describes the role of *frontisteria*. He calls their existence 'the biggest problem for education in our country' and writes:

> *Parapedeia* in the primary and, most importantly, in secondary education is an activity that causes economic bleeding to the families which can afford to pay for *frontisteria* and/or *idiaitera* and, in addition, it engages a large number of teachers of every level and area of specialisation. (...) Apart from the strengthening of educational inequalities, however, *parapedeia* causes serious problems to the children of the families which can afford the expenses of *frontisteria* and *idiaitera*. Even in the case where these children are attending morning schools, they have to stay away from home for at least 12 hours a day and 5 days a week. Some of these children are attending *frontisteria* even at the weekends. This is an exhausting time schedule for them, which leaves no time for study and recreation. These two elements are necessary for students of this age (Dretakis, 2001: 4).

The 'economic bleeding' caused by *frontisteria* is not easy to estimate because *parapaedeia* is a covert activity in Greece. In most of the cases, no receipts are issued and no open discussions are held. In the Greek and international literature there are no

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[1] If one would like to be concise, '*frontisterio*-work' and not 'homework' should be used in the case of Greek students.

published studies investigating the effect of private tutoring on students' attainment. The educational department of the NSSG does not hold any data about *frontisteria* because these are not official institutions. However, the number of legally run *frontisteria* in the country has been estimated to be 2,713 (Flessa, 1999). In the greater area of Athens – the 'Attiki basin' as it is called – there are as many as 832 legal *frontisteria* (*op. cit.*). The annual cost for *frontisterion* attendance for a *gymnasio* (lower secondary school) student is estimated to be 880 Euro on average (Papamathaiou, 1999: 6). The equivalent for those who study at the last two grades of *lyceum* is estimated to be 2,494 Euro (*op. cit.*). Both figures show the prices for the 1999 – 2000 academic year. According to the OECD inspectors report for Greece (1997) any attempt to raise funding for the public educational system is doomed to fail as long as better performing private systems compete for these resources. This discussion reveals why the Greek shadow education system of *frontisterion* has been called by the current author 'the guilty secret' of the Greek education system. *Frontisteria* are responsible (thus, 'guilty') for many educational inequalities in Greece. However, their role is hardly ever discussed by educators and policy makers and not information can be found in Greek educational journals and international publications.

2.1.4. Indicators for the quality of the Greek school system

Without basic educational statistics, discussions about the quality of the Greek educational system are severely hampered. So far, Greek policy makers and educators have used everything that according to their opinion could serve as a quality indicator. The most widely used indicators for the quality of the school system in Greece are the raw student examination grades in national examinations. Until 2001 all national Greek newspapers published what is known in Greece as 'the bases': the lowest grades that students need to have achieved in June in order to continue their studies at universities. From 2001 however students' raw grades in *lyceum* leaving examinations are used as quality indicators. For example, the main article in the first page of the Greek quality newspaper *I Kathimerini* on 21 August 2001 was that 'the quality of educational work is being put to test' because the 'base' for entrance in some university department was only 6.37 out of 20.00 (Lakasas, 2001b). Other newspapers have also publish similar articles since August 2001.

The examinations at the end of *lyceum* are designed by a steering committee that is different from year to year. In Greece, there are no item banks for the members of each examination committee to draw on in preparing the examination papers. Therefore, the psychometric characteristics of the examination papers (the distribution of the raw grades, the discrimination power etc) are only a result of the arbitrary selection of the questions to be answered from year to year. The meaning of 'educational standards' and 'educational indicators', as well as the use of examination results for drawing conclusions about the quality of a given educational system are three topics that will be discussed in more detail in the sixth chapter of the current work.

Another statistic that has been used by Greek policy makers as a quality indicator is the student participation rates at secondary level, *i.e.* the number of *gymnasio* (lower secondary school) students who continue their studies at *lyceum* (higher secondary school). According to the latest OECD country report (1997), the participation rates of students leaving *gymnasio* and continue at *lyceum* are 95 per cent for boys and 91 per cent for girls. According to the same source, no less than 923 of 1,000 entrants to primary education reach the third and last stage of upper secondary education (*op. cit.*). Of 1,000 entrants to the primary school in 1985-1986, 862 students completed the *lyceum* in 1997 (op cit.). However, these figures do not tell us as much about the real performance of the system as about the absence of student assessment during the primary and secondary school.

Two important sources of information about the quality of the Greek educational system are the Greek results in the international comparisons of students' achievement, like the Third International Mathematics and Science Study (TIMSS), and the recent Programme for International Student Assessment (PISA). Very strangely, however, information derived from these two sources has never found its way to the Greek newspapers or the Greek educational journals. It must be reminded that TIMSS was conducted in 1995 by the International Association for the Evaluation of Educational Achievement (IEA). A second phase of this study (TIMSS-R) was conducted in 1999 but Greece did not participate. The mean achievement of Greek students in the fourth and eighth grade of TIMMS was 356 (standard error 8.9) and 484 (standard error 3.1) respectively. These figures were significantly lower than those of the other OECD countries' at both age levels (OECD, 1999). PISA was conducted by OECD in 2000 on reading literacy, mathematical literacy and scientific literacy. In all these areas, Greek

students achieved statistically significantly below the OECD mean. The results of the PISA 2000 for Greek students are presented in Table 2.7 (source OECD, 2001).

Table 2.7. Some results from PISA 2000 for the Greek students.

Reading literacy				**Mathematical literacy**				**Scientific literacy**			
Mean performance		Range of possible rank order positions		Mean performance		Range of possible rank order positions		Mean performance		Range of possible rank order positions	
mean	*S.E.*	*upper*	*lower*	*mean*	*S.E.*	*upper*	*lower*	*mean*	*S.E.*	*upper*	*lower*
474	5	23	28	447	5.6	27	30	461	4.9	25	29

Note: 32 countries participated in the PISA study.

Do the results from the TIMSS and PISA prove that the quality of education in Greece is inferior to the quality of education offered in the other OECD countries? A definite answer based on TIMSS results cannot be given because Greece did not meet all the sampling requirements of IEA (OECD 1999). On the other hand, the results from PISA 2000 show that the achievement of Greek students in reading, mathematics and science literary are significantly lower from the results of most of OECD countries from a statistical point of view. One however has to wait until the publication of the Greek national results for PISA in order to come to definite conclusions. Many issues regarding the technicalities of the Greek part of PISA (e.g. the sampling procedure, the nature of controlling variables etc) are still unclear. Moreover, it must be noted here that the international comparisons of student achievement have been criticised by a team of statisticians at the London Institute of Education (see Goldstein, 1995a). Goldstein and some of his colleagues at the London Institute of Education (*op. cit.*) doubt that the use of the Item Response Theory – used in international comparisons – can eliminate the differences between cultures and educational systems. In the current researcher's opinion, the widespread existence of *frontisteria* and the extent of home tuition courses are the safest indicators for the quality of the Greek educational system.

2.2. POLICY ANALYSIS I: THE MEANING OF EDUCATIONAL QUALITY IN GREECE

2.2.1. A BRIEF HISTORY OF EDUCATIONAL QUALITY

Policy makers in Greece find it difficult to agree on the final form of an ideal, high-quality school. The Communists have in the past held demonstrations advocating the lengthening of compulsory education by three years and the Conservatives have promised that if they take office, they will abolish many of the changes of the current socialist government. The disagreements within the *Omospondia Leitourgon Mesis Ekpaidefsis* – the National Union of Secondary Teachers – (OLME) and the *Didaskaliki Omospondia Ellados* – National Union of Primary Teachers – (DOE) are highly politicised. The arguments within these two bodies are reflections of the arguments that take place in the political field between the four main Greek political parties: the ruling 'Panhellenic Socialistic Movement' (the socialists), the opposition 'New Democracy' (the conservatives), the Communist Party, and the 'Coalition of the Left and Progressive'. An agreed National Council for Education that could act as a starting point for planning and discussion on educational issues has not been introduced yet because of the difficulty of such a step. In these circumstances, searching for an ideal form of high-quality schooling in Greece is like undertaking a search for the Greek mythical beast, the Chimera. A definition for 'educational quality' must however be given before any discussion about the effectiveness of the Greek *lyceia* takes place. Thus, in the following paragraphs there will be a brief presentation of the dominant ideas and the historical development of views about educational quality. Some exemplary texts will also be highlighted. Like any other brief history, however, the following paragraphs can only attempt to telescope complex realities into neat categories. The degree of contrast between the ideas that will be presented has been emphasised in order to illuminate the main arguments. The point of departure for the exploration of educational quality is the first decade after the Second World War.

In the 1950s, the role of education in the damaged post-war economies of the western industrialised countries was perceived to be the production of economic growth. In this

era, educational quality was mainly understood in terms of returns of investment. It was the epoch in which the educational researchers, using international governmental census data, tried to demonstrate a positive relationship between investment in education and economic indicators, such as the Gross Domestic Product. An exemplary text of this era is the book *Education Economy and Society*, in which Vaizey & Debeauvais (1961) wrote a chapter about 'the economic aspects of educational development'. The authors wrote that 'hitherto education has been mainly regarded as consumption; henceforth, it is primarily to be regarded as investment' (p. 40). Thus, it could be argued, with some risk of oversimplification, that in the 1950s public schooling was directly connected in the minds of educators with economic growth.

In the next two decades, the ideas about what might constitute a 'good' educational system changed. As direct relationships between educational provisions and economic growth were not easily discernible, educators and policy makers in the western industrialised nations turned their focus on more substantive evidence of educational quality. This however does not mean that studies about educational provisions and recourses did not disappear from the political agenda. At that time, using resources effectively was becoming a very important issue. Examples of the new interest in the effective use of resources are the works of Brookover *et al.* (1979) and Jencks *et al.* (1972) in the United States, two studies that became known for their strong sociological perspective. Thus, in the 1960s and the early 1970s the schools were conceptualised as places where social progress should be seen to be occurring, rather than places where investment would be translated into economic indicators. Political conjunctions also helped to this ideology shift. The United States of the 1960s were marked by the presidency of John F. Kennedy and an explosion of equal rights and equality in educational opportunity.

Some roots of the progressive ideas of the 1960s and the early 1970s can also be found in the 1950s. Two of the editors of the book *Education, Economy and Society* published the book *Social Class and Educational Opportunity* (Floyd *et al.*, 1956). In this book, Floud and his colleagues investigated the relation between social class and access to education and they showed that children from families with low socio-economic status have little chance of success within the state public schools. The authors (*op. cit.*) proposed the reconstruction of the secondary education towards more progressive forms of schooling. A school system that according to the authors would help compensate for the social inequalities was based on the comprehensive ideal. In the United States, a

country with state educational systems, the action that was taken against social inequalities was not the development of a new kind of school but the introduction of extra educational provisions within the existing school system. Examples of such reforms in the United Stated are the efforts for the early identification and help of the 'at risk' students, the development of the 'educational priority areas', the changes in the curriculum and the teaching strategies, and the provision of special compensatory programmes. Educational priority areas were also adopted in the European contexts such as the United Kingdom and the Netherlands.

From the second half of the 1970s, the ideas about the ideal high-quality school system changed again as positive links between educational change and improved social mobility for the disadvantaged proved illusive. Public expenditures in education ceased to increase, as a result of scarce resources. In the second half of the 1970s and the 1980s there were high unemployment rates – especially among the young. In these decades, the perceived role of the state in the distribution of goods and services was diminished and more conservative – 'market-economy' principles found their way in education. In this context, the theme of 'accountability' (see Section 2.2.2) came very high in the political agenda. In 1990 Chapman & Carrier wrote in their book *Improving Educational Quality* that one of the most serious challenges facing the education system of many countries is how to meet the demands for higher quality public education within increasingly harsh economic and fiscal constrains. Thus, during the 1980s the notion of quality became closely associated with the notion of accountability.

In the 1990s the word 'quality' received increasing attention. The titles of some publications are characteristic: *Schools and Quality* (OECD, 1989), *Improving Educational Quality* (Chapman & Carrier, 1990), *Measuring the Quality of Education* (Vedder, 1992), *High-Quality Education and Training for All* (OECD, 1992), *Quality Schooling* (Aspin, Chapman, & Wilkinson, 1994), *Quality Education and Self-Managing Schools* (Townsend, 1994), *Restructuring and Quality* (Townsent, 1997) and so on. Chapman & Aspin (1994) searched the use of the term quality in the discourse and found a wide measure of agreement between educators on some core values that, according to the reviewers, might said to be typical of quality schooling. The 'core' values of quality, according to Chapman & Aspin (1994) are:

a) Schools should give their students access to, and the opportunity to acquire, practice and apply those bodies and kinds of knowledge, competencies, skills and attitudes that will prepare them for life in today's complex society;
b) schools should have a concern for and promote the value of excellence and high standards of individual and institutional aspiration, achievement and conduct in all aspects of its activities;
c) schools should be democratic, equitable and just;
d) schools should humanise students and give them an introduction into and offer them opportunities for acquiring the values that will be crucial in their personal and social development;
e) schools should develop in students a sense of independence and of their own worth as human beings, having some confidence in their ability to contribute to the society of which they are a part, in appropriate social, political and moral ways;
f) schools should prepare future citizens to conduct their interpersonal relationships with each other in ways that shall not be inimical to the health and stability of society or the individuals that comprise it;
g) schools should prepare students to have a concern for the cultural as well as the economic enrichment of the community in which they will ultimately play a part, promoting the enjoyment of artistic and expressive experience in addition of knowledge and its employment;
h) schools should conjoin education for personal autonomy and education for community enhancement and social contribution, enabling each student to enrich the society of which he or she is to become a part as a giver, an enlarger and an enhancer, as well as being an inheritor and recipient (Chapman & Aspin, 1994: 64-65).

In the turn of the millennium, a new situation has been emerged and the meaning of educational quality is changing again. The new situation has been called 'globalisation'. With reference to education, Power & Whitty (1999) have described globalisation as follows:

> As capital becomes more mobile, nations lose control over economic activity. New international regulative bodies limit national sovereignty. Technological innovations render geographic boundaries less significant, and the penetrations of commercialisation into all spheres of public life is deemed to reduce cultural differences between nations. Within advanced capitalist countries, the demise of industry has led to a fragmentation of past

> collectivities and communities. As the old power blocks break down, archetypical modernist projects of social engineering are abandoned and national systems of welfare provision dismantled. With reference to schooling, education ceases to be a publicly prescribed and distributed entitlement and becomes a commodity available for private consumption (Power & Whitty, 1999: 16).

It is very difficult to predict what the future implications of globalisation will be for Education. In fact, it is only recently that educators and teachers have started to analyse the new situation. In April of 2001, for example, a number of economists, educators and policy makers from many parts of the world met in Karlstad (Sweden) in a congress that focused on the meaning of quality in education. In this congress, Chinapah (2001) presented the current strategy of UNESCO as follows:

> In its proposal for the medium term-strategy (2002 – 2007) UNESCO emphasises the human right to quality education. (...) Quality education cannot be limited to increasing the material inputs for school systems or enhancing school effectiveness, important though they are. Quality education must be geared to enhancing each individual's potential and the full development of a learner's personality, including flexible adaptation of educational provision. It should also be intertwined with values forming the basis of social cohesion and respect for human dignity. An education of quality must necessarily contribute to peace and solidarity. Quality education should also encompass and reflect the diversity of education needs, expectations, interests, and cultural contexts. Likewise, educational policies and strategies should be promoted to foster cultural and linguistic diversity in a curriculum. Methodological guidelines and indicators for the assessment of learning achievements and for quality assurance are to be developed for such untapped domain (Chinapah, 2001: 4-5).

Another interesting analysis of the new situation can be found in a book that was published by the Centre for Educational Research and Innovation of OECD with the title *Educational Policy Analysis 2001* (OECD-CERI, 2001). In this book, the authors present four possible scenarios for the future of schooling in the long term. These scenarios are presented in Table 2.8.

Table 2.8. The OECD schooling scenarios (source OECD-CERI, 2001: 121).

The 'status quo' extrapolated scenarios	The 're-schooling' scenarios	The 'de-schooling' scenarios
Scenario 1	Scenario 3	Scenario 5
Robust and Bureaucratic school systems	Schools as core social centres	Learner networks and the learning society
Scenario 2	Scenario 4	Scenario 6
Extending the market model	Schools as focused learning organisations	Teacher exodus – the 'meltdown' scenario

The first scenario is characterised by strong bureaucracies and robust institutions. According to it, personal stakes resist fundamental change in education. Thus, the existing problems of school image and resources continue. According to the second scenario, widespread dissatisfaction with schooling leads to re-shaping of public funding and transformation of the school system. There is rapid growth of demand-driven 'market currencies', which may enlarge the existing inequalities in achievement and opportunity. In the third scenario, there is an increment in the levels of public trust and funding to education. Schools are seen as centres of community and formation of the social capital. There is extended use of Information and Communication Technology (ICT). In this scenario there is also both organisational and professional diversity and greater social equity. The forth scenario is similar to the previous one. There are also high levels of public trust and funding but here schools are understood as learning organisations. The use of ICT is maximised. There are strong quality and equity features. The fifth scenario describes the process to a society without schools. It is suggested that widespread dissatisfaction with the organised school system may turn communities to access non-formal learning using ICT. These changes will essentially reflect the 'network society' of the future. In the fifth scenario there are serious equity problems due to the different access to new technologies. Finally, the sixth scenario describes another possible 'de-schooling' process. The severe teacher shortages do not respond to policy action. The retrenchment, conflict and falling standards lead to areas of 'melt down' or crisis which may in turn provide spur to widespread innovation.

To summarise, in western industrialised societies, ideas about the role of education changed direction at least three times in the last 50 years. Starting from the

economically orientated 1950s and the 'progressive' 1960s and 1970s, the ideas tuned more towards conservative rather driven policies in the 1980s and 1990s. In the turn of the millennium, the globalisation of information is expected to bring a lot of change in the schools. In the following paragraphs, the same sequence is explored in relation to the Greek educational system. First, however, the notion of 'accountability' needs to be discussed.

2.2.2. EDUCATIONAL QUALITY AND ACCOUNTABILITY

As it was presented in Section 2.2.1, the issue of quality is one of the most central issues in the educational discourse from the late 1950s to today's era of 'globalisation'. In Section 2.2.1 'educational quality' was discussed at the macro-level, as most of the relevant work has been published from international or national organisations that are interested in the economic or the organisational aspects of schooling. Such an international organisation is OECD and more specifically, the Centre for Educational Research and Innovation (CERI) that was introduced in November 1987. The basic reason behind the introduction of CERI was the perceived need for information and benchmarks that might allow comparisons across countries and indicators of how well education is functioning in each country. For CERI, the issue of educational quality can be associated with five fields: (a) the flow of students through the education system (b) students' outcomes, (c) the schools and their environment, (d) the costs of education, and (e) students' attitudes and expectations. Many schemes for school based review have been disseminated as a result of the work of the OECD *International School Improvement Project* (Van Velzen, 1987). Other international organisations, like the World Bank, are also interested in monitoring the quality of educational systems at the macro-level (see Greaney & Kellaghan, 1996).

Another characteristic of the current international educational context is the idea that the schools and the teachers should be accountable to the wider society for the quality of education they provide. In countries with centralised educational system like, for example, Germany, teachers and not schools are mostly accountable to their educational clientele. In other countries, however, the schools and not the teachers are directly accountable to the community. The issue of accountability is the theme of the book *School Under Scrutiny*, edited by OECD in 1995. This book gives examples of how schools in different countries are held accountable for the quality of education they provide to their students. In New Zealand, for example, the board of trustees of each

school is directly accountable to the Crown, under the Public Finance Act. The Education Review Office also holds them accountable to their charters, and reports to the Minister the Ministry and the community. The way in which each school develops its own charter suggests a less formal but, nevertheless, real accountability to the local community and the parent body. In the United States schools are generally legally accountable to their local school board of district and, in terms of political rhetoric, are seen as being accountable to parents and the community for the achievement of their students. In England, the governing body of each school is ostensibly accountable to its 'consumers' – the parents of the children in the school – in relation to both financial management and students' achievement but also, through inspection (Office for Standards in Education), to the Secretary of State. Parents are elected as representatives onto school governing bodies and they are supposed to have a choice of school.

2.2.3. The meaning of educational quality in Greece

The educational reforms that were based on the vision of education as the vehicle for economic growth and pursuit of social justice have left the Greek educational system intact. Ambitious plans and high-flying objectives have abounded in Greek educational discourse, but from the 1950s until today efforts towards modernisation of the system have failed (examples of the above statement will be given in the following paragraphs). From an economic point of view, although Greeks believe that education is connected with economic prosperity, the aims of the Greek educational system have never been associated with the world of work. From a sociological point of view, although many Greek educators have highlighted the connection between Greek students' socio-economic status and their access to higher education, nothing concrete has been done to help fill the gaps of unequal opportunities. In fact, Greek sociologists had never attempted sophisticated studies about the inequalities in the Greek school system. As stated in Section 2.1.3, the quality of the Greek educational system is so low that Greek families dedicate on average one third of their annual income in order to compensate for the perceived ineffectiveness of the state school system and to promote their children's educational attainment (see also Kallen, 1997). In the fifth chapter of the current work, (page 236), it will be noted that 8 out of 10 students attend *frontisterion*. Some explanations for the situation that has just been described may be as follows.

From a political point of view it is believed that Greece is a country on the 'periphery' of the capitalistic centre (Kazamias, 1995). The country's economic formation after the

Second World War was characterised by hypertrophy in the public sector and an emphasis on certain activities like tourism and agriculture (*op. cit.*). In the 1960s and the 1970s 30% of the Greek working force emigrated to the industrialised countries of the west, the most preferred destinations being the United States, Germany, and Australia. So far, people connected by family ties have run the majority of Greek Industries. Some other features of the Greek economy were noted earlier in this chapter. The Greek educational system is very centralised and bureaucratic. Repeated efforts towards its modernisation have failed due to political circumstances and lack of consensus about the appropriate directions for educational change.

Because of these repeated failures, a very successful metaphor for the Greek educational system has been suggested in the literature. More specifically, it is said that the Greek educational system is under the ancient curse of Sisyphus. The metaphor was used by Andreas Kazamias, a leading scholar in the field of Comparative Education at an international level. In Greek mythology Sisyphus was an extremely handsome man who passed his days admiring his own reflection in the clear waters of a lake. This, however, was a blasphemy against ancient ethics and, as a punishment, Sisyphus was obliged by the gods to push a huge stone up to the peak of a mountain. The gods knew that Sisyphus would never finish his task. Every time Sisyphus approached the peak, he failed take the final decisive step to get the stone onto the top. Thus the rock rolled down the mountainside and Sisyphus' task remained uncompleted. The Greek educational system, like the mythical Sisyphus, has never changed in spite of repeated attempts at its modernisation. It has remained worlds away from other European educational systems: firmly bound to Greek national history, Greek tradition, and the Greek Orthodox religion. When the socialist government tried to reduce the hours for Greek Orthodox Catechism in the *lyceum*, the State Council (Highest Court) decided that every reduction in the teaching hours of that particular subject was against the Constitution (Decision 2176 of 1998).

The first post-war effort towards modernisation of the Greek educational system took place in the early 1960s under the National Radical Party (the Right Wing). During the 1950s, Greece was trying to heal the wounds of the civil war between the forces of the Right and the forces of the Left that followed the Second World War. In the early 1960s, Greece was a Kingdom and Constandinos Karamanlis was the Prime Minister for the National Radical Party (the forces of the Right). In Greece, as in the other countries of the western world, it was believed that education would bring economic

prosperity. The members of the Greek Education Committee (a body of experts on education) wrote in 1958 that 'education is our most positive and productive investment' (Education Committee, 1958: 43). The president of the Educational Committee in 1958 was a person who was bound to play a major role in the formation of ideas about educational quality in Greece. This person was Evangelos Papanoutsos, a national expert on educational issues.

The second – and very important – attempt towards modernisation of the system took place in 1964, during the short-lived progressive government of *Enosis Kentrou*, the Centre Party. At that time George Papandreou was the Prime Minister with *Enosis Kentrou* and Evangelos Papanoutsos, the former president of the Educational Committee, was now the Minister for Education. Ideas about an intended connection between education and economic growth were dominant in this second modernisation effort. In the introductory chapter of Law 4379 of 1964 Papanoutsos wrote that 'the upgrading of a nation's educational level is the main prerequisite for its economic prosperity and cultural development' (Papanoutsos, 1965: 331). However, Papanoutsos' plans for a modern educational system did not flourish. The Colonels' military coup on April the 21 of 1967 – a few days before the national elections – brought the Greek educational system back to its pre-1960s position. *Katharevousa*, a language with many grammatical and syntactical similarities to Ancient Greek, regained its place in the classrooms. Interestingly, the Colonels tried also to connect education with economic growth. They introduced KATEEs, the lower technology schools that were a form of non-university tertiary education. The main aim of KATEE was the training of the Greek workforce for the needs of industry. KATEE's descendants are today's Technology Institutes (TEI), a form of tertiary education equivalent to the former British Polytechnics (there are currently many efforts to upgrade the status of TEIs).

The third attempt towards modernisation of the system took place in 1977, three years after the fall of the military regime. This time 'New Democracy', the conservative party, was in power and Greece was no longer a Kingdom. Constandinos Karamanlis – the former Prime Minister with the Radical Party– was the Prime Minister with New Democracy. George Papandreou, the former Prime Minister with *Enosis Kentrou* had died during the military regime. Evangelos Papanoutsos, the progressive educator of the Centre Party, also played a major part in the educational policy of 1977. In this third modernisation effort, it was decided that the language taught in Greek schools would be the modern Greek Language, known as *dimotiki*. As described in the previous

paragraph, *katharevousa*, a difficult type of Greek, was used for teaching and learning before 1977.

In 1981, the socialists came to power and Andreas Papandreou, the son of George Papandreou of the Centre Party, became Prime Minister. Papanoutsos died in 1982 but until the end of his life he tried to link education with economic growth and prosperity. As Papanoutsos wrote in 1982, 'without a sophisticated education there is no sophisticated economy and without sophisticated economy there is no sophisticated education' (Papanoutsos, 1982: 183). The socialists, like the conservatives in 1977, adopted Papanoutsos' ideological framework and in 1986 there was a new effort for the modernisation of the system. However, the educational policy of the socialists in 1986 did not only focus on economic growth. The socialists reorganised the educational system and sought to emphasise equality and the internal reform of the system. A National Curriculum was introduced and new teaching methods found their way into the classroom. School inspection was abolished and school consultants took the place of school inspectors. A comprehensive secondary school, the integrated polyvalent *lyceum,* was introduced. For the first time in Greek educational history, state schools offered some compensatory classes for the students who needed them. The characteristic of the 1980s however was the abolition of inspection. In the minds of teachers, 'evaluation' had negative connotations. Thus educational evaluation was left to be discussed in the 1990s.

The Conservatives came to power again in 1990. In 1992 the Minister for Education, George Kontogianopoulos attempted to introduce some form of educational evaluation into the system. However, the reactions of the teachers were very strong. The Minister resigned when a teacher was killed in the riots against his reforms. The Socialists came again to power in 1993 and Andreas Papandreou became Prime Minister for a second time. His son, George Papandreou, became the minister for Education and Michael Kassotakis, an academic with a strong background in educational statistics was one of his main counsellors. In 1996, Prime Minister Papandreou died and Constantinos Simitis, a politician with social-democratic roots, became Prime Minister in his place. Simitis also succeeded Andreas Papandreou in the presidency of the Panhellenic Socialist Movement (the socialist party). Professor Michael Kassotakis became the president of the newly introduced Centre for Educational Research and with the new Minister of Education Gerasimos Arsenis (an academic with a brilliant international career in economics) designed the latest educational reform in Greece. There are two

texts from which information for the latest educational reform in Greece can be taken: the *Education 2000* programme and Law 2525 of 1997.

With Law 2525 of 1997 a form of educational evaluation has been reintroduced into the Greek educational system. *Epetirida*, the national waiting list for teachers' appointment, was replaced by a new system based on national examinations. In the national elections of the year 2000, the socialists won again (by a narrow margin) and Konstantinos Simitis remained in office. However, the previous minister of education Gerasimos Arsenis was replaced by Petros Efthimiou, a former journalist for the Greek quality daily newspaper *To Vima*. The new minister selected his own team of advisors and asked the presidents of the Pedagogical Institute (Panagiotis Exarhakos) and the Centre for Educational Research (Michael Kasotakis) to submit their resignations, which they did. The current Minister is now reviewing Law 2525 of 1997 for educational reform. Thus the attempts towards modernisation of the Greek educational system are still under way. In the next section, some points of the ongoing educational reform will be presented in greater detail.

2.3. POLICY ANALYSIS II: ONGOING EDUCATIONAL REFORM IN GREECE

2.3.1. A NEW LAW FOR EDUCATION

As reported in the previous section, in September of 1997 the socialist Minister for Education, Gerasimos Arsenis, presented the basic features of his programme *Education 2000.* This programme was designed to deal with the major problems of the Greek educational system, some of which were presented in Section 2.1. The whole effort towards modernisation of the system (*i.e.* the programme *Education 2000*, a special education law and a number of presidential decrees) has been referred to as 'the educational reform'. The funding of this unprecedented educational reform in Greece comes both from national resources (25%) and from the Second European Community Support Framework (75%). The funds from both national and European sources are administered through a programme that is called ΕΠΕΑΕΚ (*Epiheirisiako Programma Ekpedefsis kai Arhikis Epagelmatikis Katartisis* – Operational Programme for Education and Initial Vocational Training).

In the policy domain, educational reform was materialised with Law 2525 of 1997 which was voted in by the Greek parliament and took effect as from the academic year 1998-1999. More specifically, Law 2525 of 1997 introduced:

- a new type of comprehensive higher secondary school (the integrated *lyceum*),
- new curricula and textbooks for primary and secondary school students,
- new procedures for teacher recruitment,
- educational evaluation at primary and secondary level,
- new procedures for university entrance,
- combined courses and student mobility at the tertiary level,
- An Open University,
- Information and Communication Technology in schools,
- extracurricular provisions for students 'at risk',
- special programmes for students with mother tongue other than Greek, and many more.

The innovations brought by Law 2525 of 1997 were many and cannot be discussed thoroughly in this work. Thus the discussion will be restricted to the changes that took place in upper secondary education and the university entrance examinations and other issues related to the topic of this thesis.

With Law 2525, the previous form of the university entrance examinations was replaced by a system of continuous assessment during the last two years of integrated *lyceum*. The purpose of the new examination system was also different from the old one. The old examination system of '*desmes*', which aimed exclusively at selection, was replaced by a new system that focused on a combination of selection and certification. Specifically, the Minister of Education introduced the *Απολυτήριο Ενιαίου Λυκείου* (*Apolytirio Eniaiou Lykeiou*), the certificate of the integrated *lyceum*. The first students to receive their certificate were those of the academic year 1999-2000.

In the previous system, the final year of the general *lyceum* was dominated by the system of '*desmes*'. *Desmes* were four academic streams *i.e.* groups of subjects which students had to choose from for entry into higher education. The final examination in the third year of *lyceum* under the *desmes* system determined teachers and learners' approaches to learning. The system of *desmes* reinforced the role of rote learning and reduced the range of subjects that were taken seriously by students and their parents to those that appeared in the university entrance examination. The role of *frontisteria* was very significant under the *desmes* system because teachers, students, and parents focused only on four specific subjects. Under the new system, the students are examined in many subjects during the last two years of the integrated *lyceum*. The examination papers also have a new format. The essay-style, memory-based examination papers under the system of *desmes* have been replaced by standardised, curriculum-specific tests and portfolio assessment. With the above-mentioned changes in the examination system and also with the extra resources that were targeted on the upper secondary school, the socialists intended to reduce the role of *frontisteria*. They also attempted to reduce the outflow of Greek students to foreign universities by targeting extra resources on the tertiary level and by creating new places in Greek universities. Until 2000, *numerus clausus* was a dominant characteristic of the Greek tertiary level.

The programme *Education 2000* as well as Law 2525 of 1997 were fiercely resisted by certain social forces who had vested interests in the old state of affairs. These social forces include (a) those involved in *frontisteria* and private tutoring, (b) the secondary

school teachers who faced the prospect of being selected and appraised with objective criteria, (c) those in the network of studies at foreign universities (preparation, foundation courses, diplomas etc.), and (d) university teachers and lecturers in existing departments which were competitive with newly introduced departments. In the field of educational policy, these forces soon joined their voices and the opposition parties found a fertile ground for challenging the government on the issue of education. The Greek Communist Party sought to take advantage of secondary students' uncertainties about the newly established examination system. The strategy of the Communists was to gain control of the school committees, which were supposed to represent students' voice in the administration of the schools. Soon a so-called 'national co-ordination committee for taking over schools' was created by secondary students affiliated with the Communist Party. The members of this committee were not elected by students but appointed by adults in the headquarters of the Communist Party (personal communication). A number of non-elected 'co-ordinators' – also appointed by the Communist Party – addressed secondary school students through the media (television and radio) urging them to close their schools and resist the educational reform. The representatives of more moderate school committees were excluded from membership of the national co-ordination committee (personal communication). At the same time, secondary school teachers joined their voices to the voices of their students and asked for the abolition of the new education Law (2525 of 1997). A few months earlier teachers had lost their battle against the governmental plans for the abolition of *epetirida* (the official waiting list for appointment to a teaching job) and the introduction of educational evaluation. Now that the government wanted to implement a new educational policy, teachers had a chance to regain what they had lost.

At this crucial point Greek schools descended into chaos and destruction. Most of the *lyceia* were taken over by some of their students. The doors were locked for those teachers and students who wanted to continue their classes. People from outside the schools intruded and joined the students who were inside. No one could actually control who slept in the schools at night or who the people from outside were. The schools remained closed from October 1998 to February 1999. When they opened again, the extent of the damage was great. This however happened only in the state sector. In the private *lyceia* the new system worked excellently, an indicator that the new law, even with its weak points, could function. The extent of the catastrophe in the state sector, however, was disheartening. The situation was described in *The Guardian* of 26 January

1999. The headline for the report in the newspaper was very poignant: 'A Greek Tragedy'.

> Attempts to reform higher education in Greece have thrown the government and much of the country into *chaos*. (...) in an extraordinary bid to quash efforts to replace university entrance exams with continual assessment (...) petrol bombs and stones were hurled at riot police. (...) Yesterday, as students rallied nation-wide, the powerful secondary school teachers union staged the second of a series of one-day strikes against the ruling socialists' tough new [teachers'] recruitment polices. (...) For the past two months most [schools] have been occupied by youngsters, protesting against a law many had hoped would make tertiary education more accessible. (...) The scale of unrest has shocked the nation. (...) Students – some as young as 10 – have moved onto the streets, erecting makeshift roadblocks with desks, chairs and rubbish bins. (...) Greece is home to one of the most antiquated education systems in the west. Historically low educational budgets have ensured teaching methods and facilities – not least libraries – lag far behind those of other EU states. (...) But the government has made it clear: education has now become a cornerstone of its determination to modernise the country. (Smith, 1999, page *i*, emphasis added).

The fact that some of the students who took over their schools were 10-year-olds, is an indication that teachers might be behind the take-overs. In the current researcher's opinion, teachers should themselves have the courage to challenge the policies that they dislike. In no case, however, should they use children's voices as their shield. The take-overs did not stop the educational reform but invalidated some parts of it. Many schools remained closed for as long as three months. In the eyes of an educational researcher few things are worse than the sight of a closed or damaged school. The next sections describe the new type of higher secondary school which was designed by the policy-makers and resisted by the teachers.

2.3.2. A NEW TYPE OF COMPREHENSIVE SCHOOL

Regarding upper secondary education, the first aim of Law 2525 was the expansion of comprehensive schooling in Greece. Three of the four forms of Greek higher secondary school – the general *lyceum*, the technical/vocational *lyceum*, and polyvalent *lyceum* – were merged into one flexible type of comprehensive school: named '*eniaio* (integrated) *lyceum*'. The *eniaio lyceum* was based on the polyvalent *lyceum* of the past. The polyvalent *lyceum* was an experimental form of comprehensive higher secondary school

with 17 different Directions (programmes or 'branches') of studies. The integrated lyceum had only three such Directions. The polyvalent *lyceum* could not function in the sparsely populated areas of Greece. By cutting down the size of the polyvalent *lyceum*, the government tried to make the *eniaio lyceum* the only form of comprehensive higher secondary school in the country. The new form of *lyceum* consists of three Directions of studies: (a) the Humanities Direction (arts), (b) the Sciences Direction (sciences), and (c) the Technology Direction (technical or technological). From now on the *eniaio lyceum* will also be referred to as the 'integrated *lyceum*'.

Until the introduction of the *eniaio lyceum* with Law 2525 of 1997 Greek higher secondary schools had not been comprehensive, except for the 25 polyvalent *lyceia* mentioned in the previous section. Polyvalent *lyceia* were scattered throughout the country and had functioned on an experimental basis since their introduction in 1984. The two main disadvantages were their enormous size and the high cost per pupil. Moreover, polyvalent *lyceia* needed a very big area in order function properly and as a consequence they did not succeed in the sparsely populated areas of the Greek periphery, like the small islands and the small mountain towns. After the recent educational reform, the existing polyvalent *lyceia* reduced the number of Directions that they offered in order to function as integrated *lyceia*. On the other hand, the former general *lyceia*, which up to then had formed the majority of upper secondary schools in Greece, as well as the technical/vocational *lyceia*, increased the number of their Directions from one to three. Thus all Greek *lyceia* today offer three Directions of studies in their final two years. The programme of studies in the three years of integrated *lyceum* is dictated by the Ministry of Education. All students are issued with one textbook per subject. The textbooks are the same for all students in every *lyceum*. They are published and disseminated by the National Organisation for the Editing of Textbooks (ΟΕΔΒ) and they are free.

2.3.2.1. The first year of integrated *lyceum*

The first year in the integrated (*eniaio*) *lyceum* is a year of orientation. In September of each school year, students are examined in four papers for diagnostic purposes. These papers are Greek Language, Physics and Chemistry, Mathematics, and a foreign language. During the year, students are taught 10 common subjects or subjects of 'General Education' for 29 hours per week. They also have to choose one subject of 'specialisation' (two hours per week) from a list of such subjects. Students can select

another (second) subject of specialisation (two hours per week), thus being taught for 33 hours weekly in total. The subjects for General Education and specialisation are presented in Table 2.9.

Table 2.9 Subjects in the first year of integrated *lyceum*.

Subjects for General Education	Subjects for specialisation
Greek Orthodox Religion (Catechism)	Second Foreign Language
Greek Language (Ancient and Modern)	Origins of European Culture
History	Applied Computing Skills
Mathematics	Music, Drama, Fine Arts
Physics and Chemistry	Psychology
Foreign Language	
Introduction to Economics	
Technology	
Physical Education	
Vocational Orientation	

Note: Students must select one or two subject(s) for specialisation.

2.3.2.2. The second year of integrated *lyceum*

In the second year of integrated *lyceum*, the syllabus is divided into three *katefthinseis*, which are programmes or 'Directions' of studies. There is a common core of eight subjects for General Education, but in the second year of *lyceum* students must also attend three 'Direction' subjects. As was mentioned in Section 2.3.2 the Directions, are: (a) the 'Humanities', (b) the 'Sciences', and (c) the 'Technology'. The subjects that are offered in the second year of integrated *lyceum* are presented in Table 2.10.

Table 2.10. The syllabus of the second year of integrated *lyceum*.

Subjects of General Education		**Humanities Direction of studies**	
Greek Orthodox Religion (Catechism)	1	*Obligatory subjects*	
Foreign Language	2	Ancient Greek Language	3
Physical Education	2	Social and Political Structure in Ancient Greece	2/1[(a)]
Greek Language (Ancient and Modern)	6	Latin	1/2[(a)]
History	2	*Optional subjects*	
Mathematics (Algebra and Geometry)	4	Environmental Studies	2
Physics – Chemistry – Biology	4	Modern European Literature	2
Introduction to Law and Political Science	2	Second Foreign Language	2
		Introduction to Astronomy and Space	2
		Design	2
		History of Social Sciences	2
		Topics in History	2
		Applied Computing	2

Technology Direction		**Sciences Direction**	
Obligatory subjects		*Obligatory subjects*	
Mathematics	3	Mathematics	3
Physics	2	Physics	2
Communication Technology	1	Chemistry	1
Optional subjects		*Optional subjects*	
Introduction to Environmental Studies	2	Introduction to Environmental Studies	2
Modern European Literature	2	Modern European Literature	2
Second Foreign Language	2	Second Foreign Language	2
Astronomy	2	Astronomy	2
Design	2	Design	2
Chemistry	2	Biology	2
Handling Natural Resources	2	Topics in History	2
Computing	2	Computing	2

Note: The number indicate hours *per* week. The two numbers in the cell with an ([a]) indicate first and second semester.

2.3.2.3. The third year of integrated *lyceum*

In the third year of integrated *lyceum*, students attend 16 hours of General Education, 12 hours of obligatory Direction subjects and 2 hours of one selected obligatory subject. Optionally, they can opt for a second selected subject together with the first obligatory one (another two hours). The three Directions of the second year remain the same. The Technology Direction is further divided into two Directions: (a) Technology and Production, and (b) Information Technology and Services. The syllabus in the third year of integrated *lyceum* is presented in Table 2.11.

Table 2.11. The syllabus of the third year of integrated *lyceum*.

Subjects of General Education	
Greek Orthodox Religion (Catechism)	1
Foreign Language	2
Physical Education	1
Greek Literature	4
Modern Greek History	2
Mathematics and Statistics	2
Physics – Biology	2
History of Science and Technology	2

Humanities Direction of studies		**Sciences Direction of studies**	
Obligatory subjects		*Obligatory subjects*	
Ancient Greek Language	4	Mathematics	5
Modern Greek Literature	2	Physics	3
Latin	2	Chemistry	2
History	2	Biology	2
Introduction to Philosophy	2	*Optional subjects*	
Optional subjects		Modern Greek Literature	2
Second Foreign Language	2	Second Foreign Language	2
Economics	2	Economics	2
Sociology	2	Philosophy	2
Statistics	2	Statistics	2
Logic: Theory and Practice	2	Logic: Theory and Practice	2
Computing	2	Computing	2
History of Arts	2	History of Arts	2

Technology and Production		**Information and Services**	
Obligatory subjects		*Obligatory subjects*	
Mathematics	3	Mathematics	3
Chemistry – Biochemistry	2	Physics	2
Engineering and Physics	3	Computing (programming)	3
Technology and Growth	2	Computing (operation systems)	2
Electric Engineering	2	Management studies	2
Optional subjects		*Optional subjects*	
Second Foreign Language	2	Second Foreign Language	2
Economics	2	Economics	2
Industrial Production	2	Computing (applications)	2
Statistics	2	Statistics	2
Agriculture and agronomy studies	2	Agriculture and agronomy studies	2
Computing	2	Computing	2
History of Arts	2	History of Arts	2
Accounting	2	Accounting	2
Design	2	Design	2

Note: The numbers indicate hours per week.

2.3.3. NATIONAL EXAMINATIONS AT THE END OF INTEGRATED *LYCEUM* AND THE COMPLEX SYSTEM OF GRADING

The law of educational reform introduced a new type of national examination. The students in the end of the second and third year of integrated *lyceum* sit for examinations that take place in their own schools buildings. In the second year of integrated *lyceum*, students are examined in 11 common subjects and 3 or 4 direction subjects (see Table 2.10). In the end of the third year, the students are examined in 8 common subjects and 5 or 6 Direction subjects (see Table 2.11). The students who finish the second year are also examined in a general ability test, the grade of which is exclusively used for entrance in the tertiary level. The subjects that are examined in the second and third year of the integrated *lyceum* are presented in the two following tables.

Table 2.12. Subjects examined nationally in the second year of *lyceum*.

Subjects of general education	grade	Direction subjects	grade
		Obligatory	
Ancient Greek Language	B1	1st Direction obligatory subject	B11
Modern Greek Language	B2	2nd Direction obligatory subject	B12
Algebra	B3(α)	3rd Direction obligatory subject	B13
Geometry	B3(α)	*Optional*	
Physics	B4	1st Direction optional subject	B14
Chemistry	B5		
Biology	B6		
History	B7		
Religion (Greek Orthodox Catechism)	B8		
Foreign Language	B9		
Introduction to Law and Political Science	B10		

Note: Algebra and Geometry are examined separately but only one grade – the mean – is extracted.

Table 2.13. Subjects examined nationally in the third year of *lyceum*.

Subjects of general education	grade	Direction subjects	grade
		Obligatory	
Greek Literature	G1	1st Direction obligatory subject	G9
Mathematics and Statistics	G2	2nd Direction obligatory subject	G10
Physics	G3	3rd Direction obligatory subject	G11
Biology	G4	4th Direction obligatory subject	G12
Modern Greek History	G5	5th Direction obligatory subject	G13(α)
History of Science and Technology	G6	*Optional*	
Religion (Greek Orthodox Catechism)	G7	1st Direction optional subject	G14
Foreign Language	G8		

Note: Sciences Direction has only four obligatory Direction subjects.

The examination items are centrally processed and disseminated under the supervision of an examination steering committee. During the examinations, the members of the steering committee remain on the premises of the Ministry of Education without any communication with the people outside. The names of the students are written on the examination papers but are covered immediately. In the Ministry's database every students has been given an identification number. After the end of the examinations, the papers are transferred to a number of schools which function as grading centres. In these schools, a number of experienced teachers (subject-specialists) and school consultants are responsible for the grading of the papers. For every examined subject, the final grade (the Bs and the Gs in Table 2.12 and Table 2.13 respectively) is not determined only by the grade achieved in the national examination. Internal examinations conducted during the school year by the teachers of each school (subject specialists) also carry special weight in students' final grades. These internal examinations are held twice during the school year and the teachers of each school have full discretion to design, administer and grade their own tests. However, the Ministry of Education (Department of studies) provides specific guidelines to teachers and head teachers in an attempt to ensure that the internal examinations in conducted in as uniform a way as possible. More importantly, the Centre for Educational Research provides the schools with examples of tests and gives specific guidelines to teachers for the grading of students' papers. In addition, the internal examinations are overlooked by school consultants that have been specially trained for that purpose.

For each student, the final grade in the i^{th} subject is the 1/4 of the sum of the grades achieved in the two internal examinations plus two times the grade achieved in the national examination. For example, if for a student in year 2 the two grades in the internal school examinations for subject i are k_{i1} *and* k_{i2} respectively, and b_i is the grade in the national examination for the same subject, the final grade for subject i is:

$$B_i = \frac{k_{i1} + k_{i2} + 2b_i}{4}.$$

In the above equation, the grade in the national examination (b_i) is the mean of two grades, each one of which is given by an independent reviewer in the examination centre. It can be written therefore that $b_i = (b_i' + b_i'')/2$, where b' is the grade of the first independent reviewer and b'' the grade of the second independent reviewer. In the case that the difference between the grades given from the two independent reviewers is higher than 15 points, the paper is conclusively graded by a third independent reviewer.

The grade of the third person (b_i''') is the final national examination grade for subject i, that is $b_i = b_i'''$.

The grade in the national examination is protected against any extreme difference from the mean grade in the internal assessments. More specifically, the mean of the grades that are given by the teachers in the internal assessment, *i.e.* the $(k_{i1} + k_{i2})/2$, cannot differ more than three points from the grade achieved in the national examination. If we denote the difference between the mean grade in the internal assessment and the grade in the national examination by d_i, it must be $d_i \leq 3$. If $d_i > 3$, the final grade for subject i becomes $B_i = (k_i' + b_i)/2$, where, $k_i' = k_i + (d_i - 3)/2$. Students for whom the mean grade in the internal assessment is four points lower than the grade in the national examination, can ask to be re-examined from a three-member committee that is specially introduced for this purpose in every prefecture, after the end of the national examination. In that case, the new grade k_i is the grade given by the committee.

When all the grades have been finalised, the mean grade $\overline{B}$ for the second year of *lyceum* is being extracted. That is:

$$\overline{B} = \frac{B_1 + B_2 + B_3 + B_4 + B_5 + B_6 + B_7 + B_8 + B_9 + B_{11} + B_{12} + B_{13} + B_{14}}{13}.$$

In the case that a student has been examined in two optional direction subjects, the denominator of the above fraction becomes 14. For a student to continue his or her studies to year 3 of integrated *lyceum*, it must $\overline{B} \geq 10$ and concurrently:

$$\frac{B_1 + B_2 + B_3 + B_4 + B_5 + B_6 + B_7 + B_{11} + B_{12} + B_{13}}{10} \geq 9.5.$$

In the third year of *lyceum*, similar procedures are followed. For example, if l_{j1} and l_{j2} are the two grades in the first and the second internal examination for subject j, and g_j is the grade achieved in the national examination for the same subject, the final grade for subject j is:

$$\mathrm{G}_j = \frac{l_{j1} + l_{j2} + 2g_j}{4}.$$

All the corrections and measures that apply for year 2 (see the previous paragraphs) apply also for year 3. The mean grade in the third year of *lyceum* is calculated from all

the examined subjects – except for the foreign language (G_8), with precision of one decimal point:

$$\overline{G} = \frac{G_1 + G_2 + G_3 + G_4 + G_5 + G_6 + G_7 + G_9 + G_{10} + G_{11} + G_{12} + G_{13} + G_{14}}{13}.$$

In the case of the Sciences Direction, G_{13} is missing and the denominator of the fraction is 12. If a student has been examined in a second optional direction subject, the denominator is increased accordingly. The students receive their *lyceum* certificate in the end of year 3 only if $\overline{G} \geq 10$ and if the mean grade of the direction and some of the general education subjects is higher or equal to 9.5. For example, if

$$\frac{G_1 + G_2 + G_3 + G_4 + G_5 + G_9 + G_{10} + G_{11} + G_{12} + G_{13}}{10} \geq 9.5,$$

The final mark in *lyceum* certificate is one tenth of three times the mean grade of year 2 plus seven times the grade of year 3. That is:

$$\text{Lyceum certificate} = \frac{3\overline{B} + 7\overline{G}}{10} \qquad \textbf{2.1}$$

This labyrinth system of grading that was described in the current section was one of the points for which the recent educational reform in Greece has been criticised. The presentation of the grading system was necessary for the readers of the current work to acquire a better understanding of how student achievement has been measured.

2.3.4. Academic fields and university entrance

The examinations in the two final years of the integrated *lyceum* carry great importance – have 'high stakes' – for the Greek students. Kellaghan (1996) wrote that an examination has 'high stakes' attached to it 'when sanctions are directly linked to performance on the examination test' (p. 43). The results in the examinations that were described in the previous section have highly important consequences for Greek students' future educational and occupational options because they serve two important and distinct purposes: certification and selection. As it was shown in Section 2.3.3, certification and selection are connected in a rather labyrinthine way in the new system. In the newly established integrated *lyceum*, the grade in the certificate is not the only criterion for selection; the structure of the grade is also of utmost importance. In the following paragraphs the relation between certification and selection will be presented.

The readers not only will understand the structure and the 'philosophy' behind the new school but also they will probably get a clearer picture of the data that will be analysed later in this work.

According to the new law for education, every targeted tertiary institution (university level or not) is associated with one 'academic field', that is an area of specialisation in the secondary level (the integrated *lyceum*). In practice, the academic fields are groups of interconnected subjects, the grade of which carry special weight for the final outcome. For example, the grade of 'Mathematics & Statistics' – a subject of General Education – plays a very important role in the case that a students plans to study economics but not so much an important role in the case that a student plans to study Medicine. There are five academic fields: (a) Humanities, Social Sciences and Law, (b) Exact Sciences, (c) Health Sciences, (d) Technology, and (e) Economics and Management.

After the examinations, students who plan to continue their studies in the tertiary level fill in a special form in which they list the institutions that they are targeting. Each institution offers a limited number of places (*numerus clausus*) and in the case that there are more prospective students than places, the ones who enter are those who have gathered more points and have the targeted institution higher on their list. The greater possible number of points is 200. The points are calculated as follows:

Table 2.14. Points for university entrance (June 2000).

Grades	Weight	Points
Certificate of integrated *lyceum*	7.5	20×7.5=150
General Ability Test	1[(a)]	20×1=20
First subject of the academic field	1	20×1=20
Second subject of the academic field	0.5	20×0.5=10
Total		200

[a] During 2000-2001, the General Ability Test was not applied. The weight attached to it was thus distributed to the first and second subject of the academic field (see also Appendix, p. 352).

The first and the second subjects of academic field in Table 2.14 are Direction subjects. In the case that a student changes Direction, the first and the second subjects of the academic field are replaced by two subjects of General Education. In this case, the weight for the first subject is reduced to 0.7 and the weight for the second subject is reduced to 0.3. Thus, in the case that a student changes Direction, the higher possible

score for university entrance is not 200 but190 points. As it can be seen, the grading system is very complex.

To add to the complexity that was described above, the grading system changed when the new Minister of education, Mr. Efthimiou, took office. Specifically, the nationally examined subjects at the final year of *lyceum* have been dramatically reduced and the weights are now different (see Appendix in pabe 352). In addition, the examinations at the second year of *lyceum* have been essentially invalidated, as the students who fail in them now have a 'second' chance in September (the nature of September's examinations is discussed in Section 6.1). However, the changes that were introduced by the new Minister Mr. Efthimiou in 2001 are not applicable to the analysis of the current study, which is based on students' results for the year 2000.

2.4. POLICY ANALYSIS III: EDUCATIONAL EVALUATION IN GREECE

2.4.1. A BRIEF HISTORY OF EDUCATIONAL EVALUATION

Because educational evaluation is a significant component in the current thesis, a special section of policy analysis is dedicated to it. Thus in the current section, educational evaluation will be approached from a historical and comparative point of view. Three texts have set the basis for the literature review in the current section: *Fourth Generation Evaluation* by Guba & Lincoln (1989), *Assessment: Problems, Developments and Statistical Issues* by Goldstein & Lewis (1996), and *Assessment in Historical Perspective* by Wilbrink (1997).

It seems that educational evaluation was born in Europe. For researchers like Eckstein & Noah (1993) and Webber (1989) the roots of educational evaluation can be seen in Imperial China since in this country we have the first written examinations in history. Wilbrink (1997), however, states that examinations in China were for selection for higher administrational positions and were not concerned with teaching and learning. Possible influences of educational evaluation from the Muslim world should also be noted. According to Makdisi (1981), wise Muslim teachers – the equivalent of Christian Masters – themselves certified the ability of their students. In contrast, in Europe after 1200 AD the certification of learning took place in universities. In the universities of Paris, Oxford and Cambridge the evaluation took the form of public confrontation: One Master would support a position while the students of another Master undertook to demolish this position.

During the Middle Ages, students the European universities were classified in a list according to their academic and extracurricular achievements. Only in the 18th and 19th centuries with the creation of the nation-state and an increase in the number of people who took university courses ranking lists gave their place to grades of academic performance. With the new system of grades the students could get the same marks and found themselves in the same position in the evaluation list. Two countries that are late in replacing lists with grades are the United States and the UK. The former was late in achieving nation identity, whereas in the later, the University of Oxbridge confers a

unique status. As is well known, public confrontation takes place even in modern universities in the framework of examinations for the award of a doctorate degree (the *viva voce*).

At the beginnings of the 20th century, the term 'educational evaluation' was identified with the term 'measurement'. It was the post Darwin era and theories of 'scientific management' in education gained currency. From a methodological point of view, researchers were trying to use 'scientific' methods in the study of social phenomena. In this context, the developments in Statistics in the early 20th century and the construction of the first Intelligence Test by Binet, provided the fertile ground for the educational evaluation of the 'first generation'. The main characteristic of the first generation of educational evaluation is that evaluations were tended to be based on 'objective' tests and were exclusively focused on students' achievement (Guba & Lincoln, 1989; Russell & Willinsky, 1997).

After the First World War, a reorientation of educational thought took place. Educators in the USA turned their attention from teaching academic knowledge towards teaching things that would be useful for life outside the school. This reorientation turned the interest of evaluators from the persons (the students) to the content (the curriculum). In this context, the work of Smith & Tyler (1942) on educational objectives became the line that separated 'assessment' from 'evaluation' in education. Evaluation ought to be 'formative', in other words to help to the formation of educational objectives and methods. From the decade of 1950 and after, evaluation acquired an another characteristics: the characteristic of 'decision'. In the the Cold War, educational objectives were thought not only as something that needed to be clearly stated but also as something that should be 'on the right side' and be evaluated as being on the 'right side'. Guba & Lincoln (1989) expressed the view that after the 1970s educational evaluation has once more reoriented itself. According to the authors (*op. cit.*), three elements prevail in the newest evaluation paradigm: (a) equal participation of all 'stakeholders' in education as regards the objects of evaluation, (b) the ideas of postmodernism as counterbalance to the modernism of the older generations, and (c) a constructivistic epistemology as counterbalance to positive and 'scientific' methods of the previous generations. A critique of these ideas can be found in Section 4.1 of the current work.

Some more information on the epistemological assumptions of educational evaluation can be derived from Scriven. In his paper 'evaluation as a discipline' (1994) Scriven provides an epistemological framework for seeing for all types of evaluation (not only educational evaluation). Scriven's possible epistemological positions for evaluation are:

(a) the 'strong decision view' in which evaluators conduct investigations aiming to arrive at evaluative conclusions;
(b) the 'weak decision support' view, in which the evaluators collect decision-relevant data but do not go as far as evaluate conclusions;
(c) the 'relativistic' view, in which the evaluators uses their clients' value framework;
(d) the 'rich description' approach which is more a kind of ethnographic or journalistic enterprise and in which the evaluators also do not make evaluative statements;
(e) the 'social progress' evaluation, established by a group of Stanford academics who denied the importance of summative evaluation; and
(f) the 'constructivist' or 'fourth generation' evaluation, supporters of which argue that evaluation, as well as the reality, is nothing but a social construct.

2.4.2. SCHOOL SELF-EVALUATION

Closely related to the content of the previous section and to the research questions of the current study is the idea for the self-evaluation of the school. The idea for school self-evaluation was mainly explored in the 1980s. At that decade self-evaluation was seen as a strategy that could both strengthen the capacity of the school to develop and at the same time to provide evidence for accountability purposes. Hopkins & Lagerweij (1996) described school self-evaluation as one of the three most common 'internal' school improvement programmes of the 1980s. The other two programmes were 'development planning' and 'staff development'. Hopkins & Lageweij (1996) presented three examples of 'state of art' school self-evaluation programmes:

(a) the *Schools Council Guidelines for Internal Review and Development* (GRIDS) project, which was designed to help teachers review and develop the curriculum and organisation of their schools;
(b) the *Institutional Development Programme* (IDP), which was based on standardised questionnaires, consultant support and systematic feedback; and
(c) the *Systematic Analysis for School Improvement* (SAS) project, which focused on school organisation and staff development.

Another known system for school self-evaluation is the work of Fitz-Gibbon in the United Kingdom. Fitz-Gibbons' research has been conducted though ALIS ('A Level' Information System) and YELLIS (Year 11 Information System) which are two systems for rapid feedback of pupil level data to school.

There is also a number of country specific reviews of school self-evaluation projects. From the United States Gallegos (1994) describes the procedures, the categories, the standards, and the criteria used for classifying school evaluation models. The author (*op. cit.*) presents a number of representative American self-evaluation models, collected through the USA. The models are distinguished to 'national', 'regional', 'state', and 'local education agency'. Gallegos (1994) also refers to the issue of quality indicators and their relation to school evaluation. From Israel, Nevo (1994) distinguishes the school-based evaluation to 'internal' and 'external'. According to the author (*op. cit.*), school self-evaluation in Israel combines internal and external evaluation in a complementary rather than a contradictory way. The Australian experience for school self-evaluation and review has been presented by McKenzie & Harrold (1989).

With regards the to use of multilevel modelling for school self-evaluation, Bosker & Scheerens (1995) present five different approaches (see Table 2.15). The authors (*op. cit.*) demonstrate how pupil monitoring systems, which are being applied in about 35% of Dutch primary schools, can be used for the purpose of school self-evaluation and review.

Table 2.15. The different origins of school self-evaluation (from Bosker & Scheerens, 1995: 155).

Approach	Disciplinary background	Context
School based review	Social psychology – education	Schools
Management information systems	Business administration - operational research	Private industry
Educational indicators	Economics, educational statistics	Macro-level applications
Organisational diagnosis	Management consultancy	Private industry, public-sector organisations
Pupil monitoring systems	Educational measurement	(Remedial) Teaching

2.4.3. The saga of educational evaluation in Greece

After this brief historical review, the discussion centres on the saga of educational evaluation in Greece. This review has been based on a Greek book that examines the relation of educational evaluation to the sources of political power in Greece. The title of the book is *Εκπαιδευτική Πολιτική και Εξουσία* (*Educational Policy and Political Control*) and its author is Doukas (1997). This book is an extremely useful Greek text for those who are interested in an historical approach to the issue of educational evaluation in Greece. According to Doukas (1997), the main force in the history of educational evaluation in Greece has been the antithesis between the world of teachers on the one hand and the world of politicians on the other (especially the world of conservative politicians). The opinion of the current researcher is that the antithesis between teachers and politicians exists but is not as strong as Doukas (1997) claims. The opinion of the current researcher could be entitled 'the theory of corporatism'. According to this theory, a kind of political 'osmosis' exists between the teachers and some sources of political power. This is because the representatives of teachers unions in Greece are mainly representatives of political parties. Issues like educational evaluation, curricula, textbooks, and educational procedures are discussed between teachers and politicians together with issues like teachers' salaries and their system of social security. However, a discussion on this issue would be beyond the scope of the present thesis. For the time being, let us see what preceded and what followed the abolition of inspection in 1982.

In Greece the quality of schooling, as well as the performance of individual teachers, was traditionally evaluated through a special body of school inspectors. The inspectors used to visit the schools without warning and sent their reports back to the Ministry of Education. The role of the inspectors had always been part of the political control over education, but it was during the seven-year dictatorship in Greece – 1965 to 1974 – that school inspectors were used as a mechanism for ensuring that teachers conformed with the ideas of the military junta (Andreou & Papakonstantinou, 1994). When the Greek military regime ended dramatically in 1974, New Democracy (the conservative party), which came into power, changed the inspectors that appeared to have collaborated with the military regime but it did not make any significant changes to the framework of school inspection. Educational Law 309 of 1976 as well as Presidential Decree 295 of 1977 set up some new and more democratic rules for inspection. According to Presidential Decree 295, school inspectors had a double role: inspection and

consultancy. Inspection continued to be conducted with surprise visits to the schools and school inspectors' reports remained indirectly connected to teachers' promotion and pay. However, the inspectors had now to offer model teaching sessions to the teachers. This was the 'consultancy' part of their work.

Teacher unions initially welcomed the new inspectors and applauded their democratic role (Vasilou-Papageorgiou, 1990). However, by 1980 teachers' unions had already started to challenge both the credibility of school inspectors and the validity of their reports. In 1981, during the first congress of the powerful secondary teachers' union (OLME), teachers proposed the introduction of a new body of higher educational officials that would exclusively offer support and advice rather than inspection. The persons who would form this new body were to be called 'education consultants' (OLME, 1981). In the general assembly of OLME in 1982, the teachers openly asked for the abolition of the school inspectorate (OLME, 1982a). The year 1981 was also the year in which the conservatives lost the elections and the socialists came to power. In February of 1982, the socialist Minister for Education restricted the duties of school inspectors and later, with the Law 1304 of 1982, the body of school inspectors was abolished (Doukas, 1997). The same year a body of school consultants was introduced, in line with the teachers' proposals. In the educational Law 1304 of 1982, it was written that school consultants were going to undertake the evaluation of the educational system and, in order for this to be implemented, a number of presidential decrees needed to be published (Doukas, 1997).

2.4.4. THE NOTION OF 'EDUCATIONAL WORK' AND ITS EVALUATION

The teachers initially welcomed the prospect of educational evaluation being conducted by school consultants. However, a few months later they took a U-turn, by arguing that school consultants should not be allowed to evaluate the teaching personnel. According to OLME, school consultants should only evaluate teachers' 'educational work' conducted in schools (OLME, 1982b). It is important to note that the term 'educational work' was never defined by those who proposed it. Nevertheless, the teachers anticipated the publication of the necessary presidential decrees for the evaluation and in 1984 the primary teachers' union (DOE) proposed a framework for the evaluation of 'educational work', an as yet undefined theoretical construct. According to this framework, the teachers of each school would democratically plan their 'educational

work' at the beginning of the school year and would democratically evaluate the quality of their educational work at the end of the school year. After the evaluation, the teachers of each school should write a report that would be the basis for discussions at the beginning of the next academic year and a starting point for the designing of next year's educational work. Teachers' proposals can thus be seen as recommending a system for self-evaluation.

Apart from teachers' proposals, the education Minister presented two drafts for presidential decrees about educational evaluation. Teachers supported their own proposals (see OLME, 1985). Because of the disagreement between the leaders of the teachers' unions and the government officials, the presidential decrees were not issued and, consequently, that part of the educational law could not take effect. In the current researcher's opinion, the notion of the so-called 'educational work' as well as the teachers' framework for its evaluation were two examples of successful trade unionism. It has to be stressed that at that time nothing prevented teachers from implementing their own proposals. However, nothing was done about this and the result was an evaluation-free school system. Everybody realised that the educational work could not be evaluated before it was given a meaningful definition. Such definition, however, was not easy to give. 'Educational work' still remains undefined today.

In the meantime, the school consultant's role in the educational system was not clear. In 1985, a new Minister of Education took office and the Greek Parliament voted in another law for education (Law 1566 of 1985). The new law also included some articles about educational evaluation. However, the necessary presidential decrees could not be issued because teachers refused to work in the join committees with the experts from the Ministry of Education. These committees were supposed to study the technicalities of a feasible educational evaluation system. In 1988 another Education Minister took office and appointed new committees with a view to discussing the issue of educational evaluation. The new committees included teachers, university lecturers, and school consultants. The result of the work of the committees was a number of drafts of presidential decrees for evaluation (Doukas, 1997). However, the final two years of the 1980s were very turbulent for Greece and the presidential decrees did not take effect. At that time elected socialist Prime Minister of Greece Andreas Papandreou was sent to the Special Court facing charges of corruption. The Prime Minister was found not guilty but

his party lost the elections. After the elections, the Conservatives took office together with the Communist Party[1]. Thus, the 1980s ended with the problem of educational evaluation left to be solved in the next decade. It was evident that someone had to cut this Gordian Knot, to use an expression from Greek mythology. The solution would not have teachers' acquiescence. None, however, could predict have predicted the tragic events that followed.

2.4.5. THE POLICY OF THE CONSERVATIVES

The conservative New Democracy party came again to power in 1990, but this time without the communists. The Minister of Education, George Kontogianopoulos, published two presidential decrees about educational evaluation. With these presidential decrees, a behavioural 'point system' was introduced for the students and objective criteria were introduced for teachers' appraisal at local level. Teachers' unions fought fiercely against the presidential decrees. Secondary students and their teachers did not acknowledge the credibility of the law and soon serious riots broke out in the schools. Students, with their parents' support, and almost all of their teachers on their side, locked themselves into the schools and refused to open before the presidential decrees were withdrawn. In a crescendo of events, teams of parents who supported the new policies tried to reopen the schools. In the serious clashes that took place all over the country, Nikos Temponeras, a teacher of Mathematics, was killed in his classroom by an 'angry parent'. The incident took place in the city of Patra, and the 'angry parent' was the local representative of the conservative party. In the aftermath of this event, the conservative Minster of Education resigned. He later wrote in a book with reference to these events:

> The clash between the forces of modernisation and the forces of anachronism was unavoidable. The same clash shall be repeated sometimes as a tragedy, sometimes as a farce. Because the hypocrisy has eroded our society and because nobody has the necessary political courage, we all have become the followers of the same dead-end course. (...) These dramatic events were part of a general plan that aimed at bringing turmoil and political anomaly [to the country]. (...) Very irresponsibly and cowardly, the children were brought onto the streets, as if they were living shields, in order that teachers might fulfil their perfidious aims and satisfy their selfish

[1] In fact the Communist Party was then part of the 'Alliance of the Left'.

> motives (Kontogianopoulos, 1991: 15-16, current writer's translation).

The words of former Education Minister Kontogianopoulos (*op. cit.*) were prophetic. The same events were repeated in 1999 but this time with a socialist government in office (see Section 2.3.1). Coincidentally, in 1999 Kontogianopoulos and two other conservative MPs were expelled from the conservative party (New Democracy). Kontogianopoulos was voted in by the people and elected MP but this time with the socialist PASOK government.

Back in 1993 one of the first moves of the new conservative Minister for Education, George Souflias, was the withdrawal of the two presidential decrees that caused the clashes. In addition, a national dialogue on educational evaluation began. The dialogue was designed to be conducted in five successive steps: (a) a survey of people's opinions, (b) discussions in special committees, (c) dialogue with other stakeholders in education, (d) dialogue between political parties, and (e) discussion in Parliament and voting for a new law for educational evaluation (Doukas, 1997).

The first step (the survey) showed that 51% of primary teachers and 69% of secondary teachers would welcome a form of educational evaluation. Parents who had children in primary and secondary education, as well as *lyceum* students, participated in the study. The majority of these three populations accepted the need for educational evaluation. The percentages for acceptance were 83% for parents who had children in the primary schools, 83% for parents with children in secondary education, and 75% for *lyceum* students. However, in a strategic move the Minister of Education did not bring only one law into Parliament. Instead he preferred to bring in a mosaic of laws or presidential decrees on different educational issues, so that teachers might not have only one target to fight against. Thus in 1992 a draft for a presidential decree concerning educational evaluation went before the Pedagogical Institute for corrections and remarks. The outcome was Presidential Decree 320 of 1993 which legislated for school consultants now to evaluate two things: (a) teachers' knowledge of content and (b) teachers' teaching skills. For these evaluations school consultants would use special scales, with points raging from 10 to 50. As expected, teachers unions did not accept the proposals. Next year the conservatives lost the elections and the socialists came to power again. The socialist Minister for Education invalidated Presidential Decree 320, advising school consultants to restrict their evaluation duties until the publication of new

presidential decrees (Doukas, 1997). The new presidential decrees, however, were never issued.

There is an interesting question here: If the lack of educational evaluation is a result of opposition between the teachers and the politicians, how can we explain the reluctance of the new socialist government to introduce evaluation? In 1994 the socialist government was in a very advantageous position as regards the issue of educational evaluation because the presidential decrees for evaluation had been passed by the previous conservative government. The only thing that the new socialist Minister of Education had to do was to implement those presidential decrees. It needs to be remembered that at that time most parents and teachers were in favour of educational evaluation (see previous paragraphs). Why did the socialists not implement the presidential decrees that had already been voted in by the conservative government? If the 'saga' of educational evaluation in Greece is the result of a continuous controversy between the world of teachers and the world of politicians, as Doukas (1997) implies, what made the politicians to loose the battle?

According to the current author, the policy of the socialists in 1994 shows that there is no real antithesis between teachers and policy makers with regards to the need for educational evaluation. Educational evaluation in Greece is a negotiable issue, like, for example, teachers' salaries and social security system. Political parties and teachers' unions are interlinked. The hypothetical 'controversy' between them is only the surface of the everyday politics or the theme of academic discussions in educational congresses. The important things for educational evaluation happen under the surface and inside the headquarters of the political parties. There is therefore no antithesis between teachers and policy makers in Greece. Politicised teachers are the real policy makers.

2.4.6. Three remaining proposals

The next socialist Minister did not initially touch the issue of educational evaluation. Instead, following the advice of the new president of the Pedagogical Institute, he introduced a new system for students' assessment. The new examination system included examinations at the end of each school year, examination at the end of each term, and portfolio assessment. The plans for educational evaluation however were also high on the agenda. Michael Kassotakis, the president of the Pedagogical Institute and the main designer of the new system for students' assessment, wrote in a Greek daily

newspaper that 'the new examinations would allow the monitoring of the Greek educational system and the measurement of the effectiveness of Greek schools' (Kassotakis, 1994). Secondary teachers did not accept the government's new examination policy and claimed that the new examination system for students would put teachers under intolerable pressure (OLME, 1995).

In 1996 another Minister for education took office and Michael Kassotakis, the president of the Pedagogical Institute became the president of the Centre for Educational Research (CEE). The task of CEE is mainly to develop appropriate methods of student assessment. In 1997 the new Minister passed Law 2525 for education, the 8th article of which set a new framework for educational evaluation. More specifically, Law 2525 established the foundations for the introduction of *Soma Monimon Axiologiton* – the Body of Permanent Evaluators – whose work would be the evaluation of the school unit and the educational system in general. The elaboration of the technicalities of the 8th article of Law 2525 and the preparation of the necessary presidential decrees was assigned to the Pedagogical Institute. However, the people in the Department of Evaluation of the Pedagogical Institute were working on their own project for educational evaluation. The project of the Greek Pedagogical Institute was a combination of two ideas. The first was that the teachers of each school should work together as researchers in small-scale action-research studies and gather information through questionnaires, interviews and observations. The second was that each school would send the gathered information to a special centre, which would provide feedback to the teachers. According to the proponents of this idea, the Pedagogical Institute's project should be seen by the schoolteachers as a 'curriculum for educational evaluation' (Pedagogical Institute, 1999: 29).

In 1998, the project of the Pedagogical Institute was in its third pilot year with five participating schools. That year the Ministry of Education sent Circular Γ2/4791 to all the local education authorities in the country, describing a number of compulsory procedures for the evaluation of educational work. Later, on 9 of November 1998, the Pedagogical Institute sent a fax to all the schools (fax no 586) accusing the Ministry of Education of copying the Institute's ideas and trying to implement a new policy for evaluation without having the necessary knowledge. According to Ministry Circular Γ2/4791, evaluation was to be conducted in schools by the director, the deputy director, and some of the teachers. The Ministry guidelines were never implemented in the schools as teachers tacitly ignored them. That academic year the president of the

Department of Evaluation of the Pedagogical Institute, Dr. Josef Solomon, resigned. In 1999 the Pedagogical Institute published the book *Internal Evaluation and Planning of the Educational Work in the School*, in which the Institute's proposals were explained and analysed. It was, however, too late for these proposals to find a place in Greek schools.

Since October of 2001 the procedures for educational evaluation have been changing again. The advisors to the current Minister for Education must have designed a number of procedures for the evaluation of educational work, but the new procedures have neither been finalised nor made known to the public. More information about these new procedures will be presented in the sixth chapter of the current work, when the issue of educational evaluation will be reconsidered. At present, there are three proposals for educational evaluation in Greece: (a) the well-known proposal of the Ministry of Education (as found in the Law 2525 of 1997), (b) the proposal of the Greek Pedagogical Institute (as found in the book *Internal Evaluation and Planning of the Educational Work in the School*), and (c) teachers' proposals (as found in their union's publications). The teachers' proposals were restated in the 12th national congress of primary teachers' unions that took place on the island of Chios in 1998 (DOE-POED, 1998). Another landmark congress as regards the future of educational evaluation in Greece took place at the University of Patra in May of 2000. The title of the congress was: 'educational evaluation: how?' Most of the papers at that congress focused on the ontological question of the evaluation (what is to be evaluated and who defines what is to be evaluated). A significant number of papers also focused on the epistemological question of evaluation (what are the limits of our evaluation and how valid is evaluative research). Only a small number papers focused on the methodological question of evaluation (how we should evaluate the quality of education in Greece). The papers presented in the congress – essentially, the first congress on educational evaluation in Greece – were published in a book with the title *Curricula and School Evaluation*, edited by Bagakis (2001). The papers of the current researcher focused on the methodological and practical perspectives of educational evaluation in Greece (see Verdis, 2001a). The discussion about educational evaluation in Greece will be relinquished at this point; it will be resumed in the sixth chapter of the present work. In the next chapter, the discussion will centre on the notion of educational effectiveness.

3. SCHOOL EFFECTIVENESS RESEARCH AND THE QUALITY OF EDUCATION SYSTEMS

"Inquiry into school effectiveness is concerned with measuring the quality of schools; of assessing the extent to which schools achieve their goals; and of understanding the characteristics of those schools in which students make greater progress than would be expected from a consideration of their intakes".

Hill, P. (1995) School effectiveness and improvement: present realities and future possibilities. Inaugural Professorial lecture. (University of Melbroune, Faculty of Education).

3.1. EFFECTIVENESS IN EDUCATION

3.1.1. THE MEANING OF EDUCATIONAL EFFECTIVENESS

In the previous chapter, the different meanings of educational quality and educational evaluation were discussed. The formulation of ideas about educational quality and evaluation in the Greece educational policy context were also described. The current chapter is more 'technical' and less theoretical than the previous one. Specifically, Chapter 3 examines different aspects of effectiveness in education. The policy dimension of the previous chapter has provided a context for the discussion of research relevant to the theme of the thesis. The current chapter begins with a number of necessary definitions.

The term 'effectiveness' can be seen in the educational discourse as 'educational effectiveness', 'school effectiveness', 'instructional effectiveness' and 'resources effectiveness'. Scheerens & Bosker (1997: 36), following Creemers & Scheerens (1994) use the terms 'educational effectiveness' to refer to the 'effectiveness of the educational system in general' (comprising all models of schooling) and 'instructional effectiveness' to refer to the 'effectiveness of education at the classroom level'. School effectiveness will be defined later because it lies on the heart of the current thesis. 'Resources effectiveness' is economically orientated research in the case that the research is focused on the effective use of educational resource. Cheng (1996: 3) has used the term 'educational efficiency' in order to refer to resources effectiveness studies. There are also studies which are called 'cost effectiveness' analyses in education. The purpose of using such analyses has been described by Karadjia-Stavlioti as follows:

> The case for using cost effectiveness analysis [in education] is that it integrates the results of activities with their costs in such a way that one can select those activities that provide the best educational results for any given cost or that provide any given level of educational results for the least cost. It is closely related to the efficiency of the educational production (Karadjia-Stavlioti, 1997: p. 123).

Apart from cost effectiveness analyses, researchers in the realms of economy have used other methods for studying the effective use of resources in education. In the third

volume of the series *Advances in Educational Productivity*, both Walberg (1993) and Bessent & Bessent (1993) describe a procedure that is known to many economists as Data Envelopment Analysis (DEA). The idea behind DEA in education is simple. In two vertical axes y and x, a number of 'cost effective' schools are connected with a curved line. This line is called 'the front'. Each one of the other schools, which apparently are not so cost effective, have to use a strategy for improvement that will bring them near to the school of the front that has similar characteristics.

Except for the studies that focus exclusively on the effective use of resources, the realm of economics has played an important role in the development of the notion of educational effectiveness. According to Creemers & Scheerens (1994), the very meaning of educational effectiveness has its roots in economically oriented studies that have focused on educational inputs and outputs and are expressed in monetary terms with the help of educational production functions. These functions are relations between the supply of selected schooling inputs and educational outcomes, controlling for the influence of various background features like pupil to teacher ratio, teachers' salary and per pupil expenditure (Scheerens & Bosker, 1997; see also Hanushek, 1979; Monk 1989, 1992; and Bessent & Bessent, 1993 for a further discussion on such studies). The research framework of much of the research on educational production functions has been called by Fuller & Clarke (1994) 'policy mechanics'. According to these authors, studies related to the educational production functions remain influential and useful particularly in the context the developing countries. In the developed countries, however, research has moved beyond this naïve 'input-output' conceptualisations of educational effectiveness or, to quote Monk (1992), away from the 'fundamentally primitive black-box formulations' (p. 309).

In addition to the educational production functions, Scheerens & Bosker (1997) distinguish two other disciplinary backgrounds to educational effectiveness: (a) the educational psychological approach to effective instruction and learning conditions, and (b) the generalist-educationalist approach to integrated, multilevel school effectiveness modelling. These two approaches use models and relations similar to the educational production functions with the difference that they also include variables in the micro-level like the quality of instruction, the amount of the content that has been covered, the instruction strategy that has been followed, the motivation of the students, and other similar conditions of the teaching and learning transaction (Scheerens & Bosker, 1997).

Fuller & Clarke (1994) call those who are involved in such studies 'classroom culturalists'.

The origins of school effectiveness can be found in the realm of the sociology and more specifically in Coleman Report (1966), one of the most famous sociologically oriented studies in the effectiveness of schools as units. Coleman Report concluded that differences between schools were relatively minor in comparison to the impact of student race or background factors like I.Q., and socio-economic status. Other studies, however, like those conducted by Brookover *et al.* (1979), Edmonds (1979) and Rutter *et al.* (1979), gave the message that some schools were more 'effective' that others, even when the background characteristics of the pupil populations were being controlled for. From this perspective there are various educational definitions of school effectiveness and the effective school. For example, according to Mortimore (1995), an effective school is a school in which the students progress further than might be expected from a consideration of school's intake. Hill (1995) defines school effectiveness research as follows:

> Inquiry into school effectiveness is concerned with measuring the quality of schools; of assessing the extent to which schools achieve their goals; and of understanding the characteristics of those schools in which students make greater progress than would be expected from a consideration of their intakes' (Hill, 1995).

Other educators have defined the effective school from its characteristics and the ineffective school from the lack of these characteristics (see Levine & Lezotte, 1990). The problem with some of these definitions, however, is that the distinction between the 'effective' and 'ineffective' schools is not always clear. As Stoll & Myers (1997) argue, ineffective schools should not be seen merely as schools that do not have success characteristics. According to the same authors, it might be more productive to see 'ineffective' schools as having 'failure characteristics' and as having factors not seen in the more effective schools. Nevertheless, in the case of Mortimore's quote (1995), an ineffective school would be one where students made less progress than expected on the basis of intake.

Another family of definitions for school effectiveness comes from an organisational or systemic perceptive. Such a definition is that of Georgopoulos & Tannenbaum (1957), according to whom school effectiveness is:

> The extent to which any (educational) organisation as a social system, given certain resources and means, fulfils its objectives without incapacitating its means and recourses and without placing undue strain upon its members (Georgopoulos & Tannenbaum, 1957, cited in Reynolds *et al.*, 1996a: 2).

Reynolds *et al.* (1996) comment on Georgopoulos & Tannenbaum's (1957) definition, is that with this definition a school can have a low degree of effectiveness but not zero effectiveness. Another definition of School Effectiveness from an organisational point of view is that of Madaus *et al.* (1980), who define school effectiveness as:

> The extent that there is congruence between its objectives and achievements. In other words it [the school] is effective to the extent that it accomplishes what it sets out to do (Madaus, *et al.*, 1980, cited in OECD, 1991).

The definition of school effectiveness or what constitutes an effective school is very important because, according to Stoll & Fink (1996), a definition of effectiveness influences researchers' orientations and perspectives. According to Robertson & Sammons (1997) these perspectives, in turn, define the outcomes by which school effectiveness is to be judged. Because in the current thesis the educational component is stronger than the economical or the organisational one, Mortimore's (1995) definition of effectiveness would be more appropriate. Thus, in the current thesis, a school would be regarded as 'effective' if its students will be found to have progressed further than they might be expected from a consideration of school's intake. This definition will be better understood when 'type A' and 'type B' school effects will be discussed in page 151.

3.1.2. Types of research traditions in educational effectiveness

In the most recent review, Scheerens & Bosker (1997) have divided the literature of educational effectiveness into five types of research traditions, each concentrating on a different aspect of effectiveness. These areas are:

1. Research on equality of opportunities in education and the significance of the school in this.
2. Economic studies on education production functions.
3. The evaluation of compensatory programs.
4. Studies of effective schools and the evaluation of school improvement programs.
5. Studies on the effectiveness of teachers, classes and instruction procedures.

The studies on education production functions deal with the task of manipulating the inputs that increase the outputs of education. These studies therefore are studies in the field of educational economics. Scheerens & Bosker (1997), reviewing early work on educational production functions, conclude that relevant studies have produced inconsistent findings.

Compensatory programs are programs that intend to improve the levels of performance of the educationally disadvantaged. Such programs have been carried out mainly in the USA. The most widely known such program in America is the *Head Start* and its sequel *Follow Through*. The results of these programs have been difficult to assess because their long-term effects are believed to be more important and because it has been demonstrated that it is the moderately disadvantaged pupils that have mostly benefited from them.

The research on effective schools and the evaluation of school improvement programs touches the core of School Effectiveness studies. Effective school research, in contrast with the research on educational production functions, has attempted to open the 'black box' of the school by studying process characteristics related to organisation and curriculum. Scheerens & Bosker (1997) distinguish three types of effective school studies:

1. Studies of schools that are identified, after controlling for the prior achievement of students, as displaying an exceptionally favourable output. These positive 'outlier' schools are then analysed to determine what distinguishes them from schools with an unfavourable output (negative outliers).
2. Studies in which the knowledge base of research of studies of 'exceptionally effective schools' are adopted for school improvement programs. A more recent category in which larger scale studies are made of the school characteristics that are related to the achievement level.
3. Studies of the effectiveness of teachers and teaching methods. These studies do not fall exactly in the area of School Effectiveness but Scheerens & Bosker (1997) state that the impact of effectiveness-promoting school characteristics on pupils' performance largely happens via class teaching techniques. According to the same authors (*op. cit.*) research results in the field of instructional effectiveness are

centred around three major factors: (a) effective learning time, (b) structured teaching and (c) opportunity to learn.

3.2. SCHOOL EFFECTIVENESS: THE ORIGINS AND CURRENT STATE OF AN INTERNATIONAL RESEARCH MOVEMENT

3.2.1. First generation of school effectiveness studies

In the previous section a number of definitions for educational and school effectiveness were presented. In this section, the movement of School Effectiveness will be presented in its historical development, so that the reader of the current work can acquire a better picture of the forces that have shaped contemporary character of the school effectiveness research tradition. Section 3.2 has been based on one of the most important books on School Effectiveness that have being published until today: *The International Handbook of School Effectiveness Research*. The *Handbook* has been edited by Charles Teddlie and David Reynolds (2000) and includes contributions from some of the most influential scholars in the field.

The school effectiveness research tradition has a history of expansion for more than 20 years. In these two decades, the educational community has witnessed the development of a very influential research movement that brought together researchers and practitioners from a wide spectrum of areas like statistics, educational evaluation, subject didactics, and educational policy. The main tenet of this movement, according to the titles of some of the most prominent pieces of work, is that 'schools matter', or that they 'can make a difference'. In the last two decades, School Effectiveness has been a very active area of inquiry. International conferences for school effectiveness and improvement are held regularly from 1988 onwards in different countries and special country reports are published every two years. Collections of the most important papers of some of the congresses have been published by Reynolds, Creemers, & Peters (1989), Creemers, Peters, & Reynolds (1989), Bashi & Zehava (1992), Creemers & Osinga (1995), and Townsend *et al.* (1999). A journal, *School Effectiveness and School Improvement*, is edited quarterly by Bert Creemers and David Reynolds and many issues of the *International Journal of Educational Research* are edited by Jaap Scheerens, Herbert Walberg and other scholars who work in the area of educational effectiveness and productivity. In the following section, the main points of the school

effectiveness movement will be highlighted. The presentation starts with the first qualitative studies of the 1970s and will finish to the state-of-art studies of the 1990s and the early 2000s. In this twenty years long advancement of School Effectiveness, Creemers (1996) distinguishes two 'generations' of research. This distinction will be used by the current author as a framework for presenting key studies and their main findings.

Studies of the 'first generation' of School Effectiveness were carried out in the 1970s, mainly in the USA but also in the UK. The studies of the first generation were conducted as a reaction to the pessimistic findings of a congressionally mandated study *Equality of Educational Opportunity*, carried out in the USA by James Coleman and his colleagues and known as the *Coleman Report* (Coleman *et al.*, 1966). Coleman was interested in the educational opportunities that were available to different racial and ethnic groups in the American schools. He collected data from over 4,000 schools and analysed the results of standardised tests of ability and achievement for 645,000 pupils. The outcomes were used to relate school resources to pupil achievement. The main conclusion was that school differences accounted only for 5 to 9 per cent of differences in pupils' attainment. Daly (1995) later characterised this 9 per cent 'a benchmark' for the modern school effectiveness studies.

Five years after Coleman, Christopher Jencks and his colleages (1972) reached similar conclusions. In the book *Inequality*, Jencks and his colleagues argued that the most important determinant of educational attainment is family background and that the main purpose of schools is to get children to behave as administrators want them to behave. Schooling, Jencks (*op. cit.*) claimed, cannot affect the distribution of incomes. In the United Kingdom much sociological but also educational research yielded similar findings. Plowden (1967), in her report *Children and Their Primary Schools* argued that family is the strongest determinant of a student's success and suggested that teachers should work in order to involve parents in schools. The studies noted above were disheartening for educators and educational researchers because it seemed that schools could not win in the battle against educational and social inequities. If the impact of students' societal background is so strong, what remains to be done in the school and what can teachers hope for in their combat against social injustice?

The findings of studies by Coleman and Jencks were seen by some educators as stimulus for further research to better explore the influence of school. New studies were

published that suggested that some schools did in fact do much better than could be expected of them in terms of students' outcomes. Most of these early studies used fairly simple qualitative designs of comparing the 'good' and the 'bad' schools or positive and negative 'outliers' for schools that served broadly similar intakes. In such an 'outilier' study, Weber published the report *Inner-City Children Can Be Taught to Read* (1971). Weber (*op. cit.*) argued that some schools can offer much more to their pupils and that the characteristics of the 'successful' schools can be identified. Thus Weber listed a number characteristics like strong leadership, high expectations, and good atmosphere. The atmosphere of the school was the topic of another 'outlier' study that was conducted later by Sarason (1981). In his study *The Culture of the School and the Problem of Change* Sarason (1981) provided impetus for educators to consider the internal life of schools and its influence on students' experience and attainment. Finally, another outlier study was conducted by Phi Delta Kappa in (1980) to investigate the reasons that certain schools 'succeed' whereas some others 'fail'.

Brookover and his colleagues (1979) in the United States, tried to identify school effects by using surveys to measure student and teacher perceptions of school climate. Their book *School Social Systems and Student Achievement* became known with its subtitle: *Schools Can Make a Difference.* Brookover and his colleagues (*op. cit.*) gathered quantitative data from 159 schools that were broken down to particular sub groups. A random sample of 68 elementary schools in Michigan U.S.A. was among these sub groups. For these schools, Brookover and his colleagues developed 14 social psychological climate scales and related school climate variables, school level measures of students' socio-economic status and school racial composition with mean school achievement. Later, for reasons of adding depth to the correlation study, detailed observational studies in four outlier schools were conducted. The differences in students' attainment between the schools were significant and the researchers looked systematically for specific features of schools' social structure in order to explain them.

Jencks and his colleagues (1972) considered various school characteristics that could explain the variation between schools like school size, attendance rates, teachers to student ratio, teachers' qualifications and so on. In Brookover's study however, the focus was on school's operational aspects as teachers and students perceived them to be. Brookover (*op. cit.*) not only showed that students' social and racial background did not completely explain the variation in schools' outcomes, but also concluded that the combination of school's social structure variables (*i.e.* the combination of social

composition and personnel inputs from one hand and the social climate from the other) accounted for more than 85 per cent of the between school variance in mean Reading and Mathematics achievement. The work of Brookover had very strong policy implications. As Silver (1994) notes, the book *Schools Can Make a Difference* turned the pieces of effective school research into a research movement.

Another important study in the United States was that of Edmonds (1979) with the title *Effective Schools for the Urban Poor.* Before 1979, Ronald Edmonds, an African American educator, had written a number of papers relating to effective schools. He was also one of those who criticised the research methodology of Coleman's Report. His paper *Effective Schools for the Urban Poor* had a far-reaching influence with both researchers and policy makers. In his book, Edmonds (1979) highlighted three points: (a) that schools should give an emphasis to promoting social equity, (b) that schools should set a minimum of attainment standards for all the children, and (c) that schools and teachers should not be absolved from their responsibilities to promote basic skills, regardless of the social or racial background of their students. The most important feature of Edmonds' (1979) paper, however, was a list with five characteristics of effective school. Other researchers expanded and revised Edmonds' list since its first publication in 1979 but the central elements of the original have been maintained until today the same. The original characteristics highlighted by Edmonds were: (a) strong educational leadership, (b) high expectations of student achievement, (c) an emphasis on basic skills, (d) a safe and orderly climate, and (e) frequent evaluation of pupil progress. Samouilidi (1995) in her PhD thesis sought Edmonds' five characteristics in seven Greek integrated polyvalent *lyceia.* She interviewed a number of students from each school and claimed that all integrated polyvalent *lyceia* in Greece, posses Edmonds' five original characteristics. Nowadays, Edmonds' list is not the only list with effective school characteristics. Other such lists are presented in Section 3.4.1.

On the other side of the Atlantic, the United Kingdom, the School Effectiveness research had had 'a somewhat difficult infancy', to use Reynolds, Sammons, Stoll, Barber, & Hillman (1996b) expression. The British researchers traditionally put emphasis on the psychological perspectives of school success and the school and family relationships. This approach was supported by a very strong sociological tradition in the United Kingdom that understood schools as the determinants of students' social mobility or lack of it but did not perceive them as organisations which could have an influence outside of the constrains of social structure. In addition, in contrast with what

happened in the United States, there was also in the U.K. a lack of instruments for measuring school climate. Nevertheless, some influential studies on school effectiveness and some studies on school and classroom effects were conducted. Some of these studies will be presented in the following paragraph.

In an early British study, Michael Power (1967) investigated variations in effectiveness in terms of social behavioural outcomes of students in a study of 'delinquent' schools. In another British study, Brimer *et al.* (1978) published for the National Foundation of Educational Research the book *Sources of Difference in School Achievement.* The most discussed early school effectiveness study in the UK however, was *Fifteen Thousand Hours,* by Rutter *et al.* (1979). Rutter and his colleagues found a number of factors that were connected with high levels of school effectiveness. Rutter *et al.* (1979) original factors were (a) the reward system of the school, (b) the school physical environment, and (c) the use of the homework in the school. Other factors like the school size and the physical characteristics of the school were not strongly associated with school outcomes in that study. Moreover, Rutter *et al.* (1979) suggested that effective schools were consistently effective across a range of student outcomes.

Fifteen Thousand Hours was sharply criticised for its methodology and statistical analysis (see, for example, Goldstein, 1980 and Tizard *et al.*, 1980). These criticisms are examples of the 'difficult infancy' of school effectiveness research in the United Kingdom. In two other countries, in which much of today's state-of-art school effectiveness research is being produced School Effectiveness had also had a difficult start. In Australia, there was scepticism about the use of standardised achievement tests as measures of the effective schools. Instead, Australians paid more attention to the social outcomes of the schools. Finally, in the Netherlands, school effectiveness research did not begin until the mid-1980s. More information about the development of school effectiveness research in Australia and the Netherlands will be presented in the following sections.

3.2.2. Second generation of school effectiveness studies

From the early 1980s, the studies of first generation were criticised on the grounds that they were biased and lacking verifiable evidence for their empirical claims. Purkey & Smith (1983), in one of the first review studies in the area of school effectiveness,

distinguished the five following weaknesses of the studies of the first generation: (a) small and unrepresentative samples, (b) possible errors in identifying effective schools, (c) achievement data aggregated at the school level, (d) inappropriate comparisons, and (e) the use of subjective criteria in determining school success. School Effectiveness studies of the second generation did not begin until the mid-1980s. This was the era when the researchers attempted to address the criticisms of the previous generation and, most importantly, they utilised the new statistical techniques that took into account the hierarchical structure of the educational systems. In the early 1980s, new statistical algorithms and packages were developed simultaneously in the United States and the United Kingdom. The new statistical models were called 'hierarchical linear models', 'parameter-varying models', 'variance component models', or 'random coefficient models'.

The statistical foundation of the statistical models that were presented in the previous paragraph can be found in a paper by Lindley & Smith (1972) 'Bayes estimates for the linear model'. In the realm of education, the new models were used as a tool to question the claims of Bennett's (1976) that 'progressive' teaching methods were unsuccessful. Thus in a paper published in the *Journal of the Royal Statistical Society* five years after Bennett's (*op. cit.*) claims, Aitkin *et al.* (1981) showed that Bennett had actually overstated the extent of the observed differences between teaching styles. That was because the variability between teachers in pupils' progress (*i.e.* the hierarchical structure) in Bennett's (1976) study had been ignored. In 1986 Aitkin & Longford published another paper in the *Journal of the Royal Statistical Society* with the title 'statistical modelling in School Effectiveness Research studies'. The same year Goldstein (1986) published a paper titled 'multilevel models in educational and social research' and in the next year published the book *Multilevel Models in Educational and Social Research* (Goldstein, 1987). In the United States Raudenbush & Bryk (1986) published in the *Sociology of Education* an article titled 'a hierarchical model for studying school effect'. In 1989, Bock published a collection of 12 papers written from statisticians and methodologists about the use of new statistical models in the area of education. The title of Bock's book was *Multilevel Analysis of Educational Data.* Similarly, Raudenbush & Willms (1991) published another collection of 14 articles based on an international conference held during the summer of 1989 in Edinburgh. The book comprised 14 articles and its title was *Schools, Classrooms and Pupils.* Its subtitle, however, was much more illuminating: *International Studies of Schooling from a*

Multilevel Perspective. Thus, the advances in the front of applied statistics enhanced the methods and the design of school effectiveness studies. Studies with an outlier design did not disappear completely but the notion of 'value added' found its way from the realm of the economy to the realm of education. The meaning of 'value added' will be analysed later. Its history in education has recently been reviewed by Saunders (1999).

Apart from the issue of statistical analysis, more adequate techniques were also used for data collection in these second-generation school effectiveness studies. Instead of using questionnaires, researchers in the 1980s used direct observation and behaviour checklists. Researchers began now to consider the context and the social organisation of of the schools in more depth, to construct scales for measuring administrational issues and develop more sensitive output measures. In the same period, the school effectiveness research tradition began to expand to other countries, such as the Netherlands, the former Hong Kong, Norway, Israel, Taiwan, Mainland China, Canada, Australia, and also in some Eastern countries (for the latest country reports see Townsend *et al.*, 1999). Two of the most important school effectiveness studies in the 1980s were (a) one that conducted by Peter Mortimore and his colleagues in the United Kingdom in 1988 and (b) another that was conducted by Teddlie & Stringfield (1993) in the United States. These two studies will be presented below.

Mortimore *et al.* (1988) and his colleagues selected a sample of 50 primary schools in the Inner London Local Educational Authority and attempted for the ages of 7-11 what Rutter (1979) and his colleagues (including Mortimore) had done previously for secondary schools in the *Fifteen Thousand Hours*. The tittle of Mortimore's work was *School Matters*. The study was completed by the end of the 1980s and was one of the first studies to take advantage of the powerful new statistical techniques that described in the previous paragraph. Mortimore *et al.* (1988) investigated a number of fundamental school effectiveness issues like the size of school effect, the notion of the differential school effectiveness, and the factors that contribute to the enhancement of the school effectiveness. His central questions were: (a) whether some schools or classes were more effective than others when controlled for variance in pupil intake, (b) whether some schools or classes were more effective for certain groups of pupils (the notion of differential school effectiveness) and finally, in the case that some schools or classes were found to be more effective that others, (c) what factors could explain the difference in effectiveness. The main answer to Mortimore's questions was also the title of his book: *School Matters*. In addition, a set of 12 characteristics of the effective

school and classroom practices were identified: (1) a purposeful leadership, (2) involvement of the deputy head and (3) involvement from the part of the teachers, (4) consistency among teachers, (5) structured sessions, (6) intellectually challenging teaching, (7) a work-centred environment, (8) sharp focus within sessions, (9) maximum communication between teachers and pupils, (10) record keeping, (11) parental involvement, and (12) a positive climate.

Teddlie & Stringfield (1993) carried out their major research, the *Louisiana School Effectiveness Study*, in the United States. The study was in fact an ambitious programme of four studies and had a longitudinal design, starting in 1980 and ending in 1992. The researchers used both qualitative and quantitative techniques and collected data from the school and the classroom level. Differences between 'effective' and 'ineffective' schools were found. Some of the correlates of the effective schools were 'time on task', 'high expectations from the part of the teachers', the type of discipline, the presentation of new material and the physical condition of the school. Qualitative case studies of 'outlier' schools were also used in the *Louisiana School Effectiveness Study* to give insight into the characteristics of particular schools. The study drew particular attention to the impact of socio-economic status and school context.

3.2.3. The current state of School Effectiveness Research

In the 1990s, the school effectiveness research flourished in a number of countries apart from the USA and the United Kingdom. Two of these countries are the Netherlands and Australia. The development of school effectiveness research tradition in these countries will be the theme of the following paragraphs. According to the *International Handbook of School Effectiveness Research*, in the Netherlands quantitatively sophisticated research seems to be relatively unused within practice (Reynolds, Teddlie, Creemers, Scheerens, & Townsend, 2000). Dutch researchers in the area of School Effectiveness have investigated the contribution of various factors to students' achievement and explored the issue of the differential school effect. Bosker (1990) and Luyten (1994), for example, found inconsistency in effectiveness across students with different characteristics and different school sub-units respectively.

Other Dutch researchers have investigated special factors that are related with the effectiveness of the schools. For example, Reezigt (1993) studied the grouping

procedures in the schools whereas Ros (1994) studied the effect of the co-operation between students. An interesting finding in the Netherlands has been the contribution of educational leadership on students' outcomes. Early research showed that good educational leadership was not correlated with students' achievement (see van de Grift, 1990). Later studies, however, like the one conducted by Lam & van der Grift (1995) developed more sensitive instruments for leadership and found positive correlation between good leadership and student outcomes. Other Dutch researchers in the University of Groningen have turned their attention to instructional effectiveness instead of the effectiveness of the school as an organisational unit. Creemers (1994), for example, has investigated the role of alternative epistemological and educational frameworks of instruction and has focused on the constructivist approach of learning (rather, on the constructivist approach of 'constructing knowledge'). Another notable study in the Netherlands is that of Brandsma *et al.* (1995), who conducted an experimental study in order to compare school-level and classroom-level determinants of Mathematics achievement in secondary education. Brandsma *et al.* found that the most important factor of students' success was teachers' behaviour and the quality of instruction. Finally, in University of Twente a number of simulation-based analyses of educational effectiveness have been produced (see De Vos, 1998).

In Australia, School Effectiveness has been used as a tool for the improvement of the schools and for designing educational policy. For example, the *Good School Strategy* was an activity initiated by the Australian Education Council. In the context of the *Good School Strategy*, more than 2,300 schools responded to an open-ended questionnaire which investigated peoples' views of school effectiveness (McGaw, Piper, Banks, & Evans, 1992). The implications for policy makers were that: (a) accountability must be sought in a local level, (b) discipline problems does not affect effectiveness and improvement, (c) achievement is not the only thing that is worth fighting for in schools, and (d) the role of central administrators in school improvement is important (McGaw *et al.*, 1992, cited in Reynolds *et al.*, 2000: 22). In recent years a number of studies in Australia have considered a variety of issues. The most promising of these issues is classroom effectiveness (see Rowe, 1991), the relation between classroom effectiveness and school effectiveness (see Hill *et al.*, 1993; Rowe *et al.*, 1994), and the relationship between school effectiveness and school self-management (see Townsend, 1997).

In the United Kingdom, a lot of research has been conducted in the area of school effectiveness during the last decade. Moreover, in England and Wales, School

Effectiveness has connected with educational evaluation both summative form (educational accountability) and its formative form (educational improvement). Important aspects of the connection between School Effectiveness Research and educational evaluation in England and Wales are presented in Section 3.2.4 of the current study.

School Effectiveness Research in the United Kingdom has been focused lately on the dimensions of school effectiveness and equity issues. Smith & Tomlinson (1989) studied the school effects in Mathematics and English Language and were of the first to show that schools can be differentially effective between subjects. According to the *International Handbook of School Effectiveness Research* (Teddlie & Reynolds, 2000: 15-16), ongoing cutting-edge work in the United Kingdom focuses on:

1. Stability over time of school effects (see Goldstein *et al.*, 1993; Gray & Wilcox, 1995; Thomas *et al.*, 1997a).
2. Consistency of school effects on different outcomes (see Goldstein *et al.*, 1993; Sammons *et al.*, 1996; Thomas *et al.*, 1994).
3. Differential effects of schools for different groups of students (see Goldstein *et al.*, 1993; Jesson & Gray, 1991; Sammons, Nuttall, & Cuttance, 1993a).
4. The relative continuity of the effect of school over time (see Goldstein, 1995b; Sammons, 1996; Sammons *et al.*, 1995b).
5. The existence or size of school effect (see Daly, 1991; Gray *et al.*, 1990; Thomas *et al.*, 1997a). A number of authors (Sammons *et al.*, 1993ab) suggest that the size of primary school effects may be greater that those of secondary schools.
6. Departmental differences in educational effectiveness (see Fitz-Gibbon, 1991, 1992). Fitz-Gibbons' research has been conducted though ALIS ('A Level' Information System) and YELLIS (Year 11 Information System) which are two systems for rapid feedback of pupil level data to school.
7. The international dimension and the context specificity of school effectiveness, through the International School Effectiveness Research Project (ISERP) (see Creemers & Reezigt, 1996; Reynolds *et al.*, 1994).
8. The different characteristics of the ineffective schools (see Reynolds, 1996; Stoll & Myers, 1997).
9. The assessment of 'value added' using already available data (see Fitz-Gibbon, 1996a, 1997).

10. The characteristics of improving schools and the factors that are associated with successful change over time (see Gray et al., 1999).
11. The description of the characteristics of effective departments (see Sammons, Thomas & Mortimore, 1997; Harris, Jamieson, & Russ, 1995).

As regards the current state or affairs in the United States, Reynolds *et al.* (2000) present in the *International Handbook of School Effectiveness Research* (p. 13-14) a number of reasons as regards the decline in the production of school effectiveness studies in the USA. The reasons listed by Reynolds *et al.* (2000) are:

1. the scathing criticisms of early effective schools research, which led many educational researchers to steer away from the more general field of school effectiveness research and fewer students to choose the area for dissertation studies after the mid-1980s;
2. the fact that several of the researchers who had been interested in studying school effects moved towards the more applied areas of effective schools research and school improvement research;
3. other researchers interested in the field moved away from it in the direction of new topics such as school restructuring and school indicator systems;
4. the delay in the development of commercially available statistical packages for multilevel analysis;
5. the failure of the input-output models of cost effectiveness to produce significant relationships among financially driven inputs and student achievement;
6. the reduction in the federal funding for educational research during the Republican administration between 1990 and 1992;
7. the breaking of communication within the school effectiveness research community with the more 'scientifically' oriented researchers becoming increasingly involved with the statistical issues associated with multilevel modelling, rather than with the educational ramifications of their research (Reynolds *et al.*, 2000: 13-14).

3.2.4. Britain and Wales: School effectiveness and school improvement

In the books *Schools Under Scrutiny*, edited by OECD-CERI (1995b); *Third Millennium Schools*, edited by Townsend *et al.* (1999); and *Education in a Single Europe*, edited by Brock & Tulasiewicz (2000) there is information about both educational policy and the opportunities that School Effectiveness Research has given

to educational policy. England is an interesting case for exploring the impact of School Effectiveness Research on educational policy and evaluation. With the Education Reform Act of 1988 the conservative government in England and Wales centralised decisions about curriculum and standards by:

- introducing the National Curriculum;
- requiring pupils to sit tests measuring their attainment in relation to the curriculum at four 'key stages' (specifically, at the ages of 7, 11, 14, and 16);
- requiring local education authorities to delegate managerial and financial responsibilities to individual schools;
- allowing pupils to apply for any school, with the right of admittance as long as there are free places (open enrolment);
- ensuring that each school's budget is calculated according to the number of pupils who enrol; and
- giving schools the option of full autonomy by opting out of local authority control (OECD-CERI, 1995b).

A 'Parents Charter' published in 1991 set out the entitlement of parents to know the characteristics of the schools which their children are attending. The information to the parents took the following three forms: (a) quantitative indicators of school 'performance' in relation to national trends, (b) regular reports produced by schools on the progress of individual children and (c) regular inspections of the schools by teams of independent inspectors. These inspection teams comprise former school inspectors as well as people who do not have any relation with education. Inspectors under the new system bid for contracts commissioned by the Office for Standards in Education (OFSTED). In this framework every school was supposed to be inspected every four years; the schools are required to draw up action plans in response to the inspection reports. A summary of each report and the action plan are sent to all parents of the school. By September 1997, 340 schools had been designated as having failed the OFSTED process and requiring 'special measures'.

The Labour Government which came into power in 1997 not only continued most of the previous Conservative policies but also increased the central government's powers. In the paper *Excellence in Schools*, the Labour Party emphasised literacy and numeracy in primary education, advocated setting in secondary education, envisaged home-school contracts, and promised additional school performance information to parents and

schools. The additional elements in terms of the system's quality monitoring were: (a) the introduction of standards and performance related pay for teachers, (b) the introduction of the General Teaching Council, and (c) the introduction of the National Professional Qualification for Headship and the National Qualification for Subject Leaders for head teachers and subject leaders respectively.

In the context presented in the previous paragraphs, researchers in the field of school effectiveness have in many cases sought to inform policy makers. Goldstein & Myers (1997) have argued that politicians and officials in government often 'cherry pick' school effectiveness research findings to legitimate their policies. A list of government agency-commissioned studies of school effectiveness in the United Kingdom can be found in Stoll & Riley (1999). The authors present a number of research projects, literature review studies and evaluation of initiatives that are presented by the current researcher in Table 3.1.

Table 3.1. Some research projects in the United Kingdom (based on Stoll & Riley, 1999: 23-24).

Organisation	Academic Department	Project
DfEE	University of Sheffield	Developing models for evaluating 'effective' schools and departments, using National Curriculum Key Stage 3 and GCSE data
SCAA	University of Durham	Baseline assessment (of young children on entry) and value added (Tymms & Williams, 1996)
SCAA	University of Durham	The Value Added National Project (VANP), to investigate a design for a value added system for England (Fitz-Gibbon, 1996a; 1997)
DfEE	University of London, Institute of Education	Analysis of national GCSE and A level database (O' Donoghue *et al.*, 1997)
OFSTED	University of Newcastle	Worlds Apart, a literature review for OFSTED, that looked at international achievement surveys and their implications for Britain (Reynolds & Farrell, 1996)

Organisation	Academic Department	Project
DfEE	University of London, Institute of Education	Case studies of schools that have come off 'special measures'
OFSTED	University of Cambridge, Institute of Education	A project examining post-inspection action planning and school improvement following inspection in special schools (Sebba, Clarke, & Emery, 1996)
DfEE	Open University and University of Bath	A study of effective teaching and learning in work-related contexts (Harris, Jamieson, Pearce, & Russ, 1997)
DfEE	University of London, Institute of Education	The influence of factors outside the formal school curriculum
DfEE	Institute of Education (University of London) and University of Nottingham	School Development Planning for Student Achievement
DfEE	University of Cambridge and Homerton College	A review of School Effectiveness Grants for Educational Support Training (GEST) – School Evaluation.
DfEE	University of London, Institute of Education	Governing bodies and target setting
SOEID	University of Strathclyde and University of London, Institute of Education	The Improving School Effectiveness Project (Robertson & Sammons, 1997)

In addition to the advice that school effectiveness researchers have provided to governmental bodies, many academic centres in the United Kingdom provide also advice to Local Educational Authorities and individual schools. In many cases researchers in the area of School Effectiveness have helped schools and local educational authorities to develop a framework for value added analysis. For example, the International Centre for School Effectiveness and Improvement (ISEIC) at the London Institute of Education has worked with Hampshire, Southwark, Surrey, and Lancashire Local Educational Authorities. Another academic centre that also supports schools and Local Educational Authorities in the analysis of quantitative and qualitative data in the United Kingdom is the National Foundation of Educational Research. This centre offers a framework for quantitative analysis for the self-evaluation of secondary schools, using value-added analysis of GCSE results. Finally, one of the most important frameworks of research-driven school self-evaluation and feedback has been developed by Fitz-Gibbon and Tymms at the University of Durham. Fitz-Gibbon's framework includes the A-Level Information System (ALIS), the Year-11 Information System

(YELLIS), the Middle Years Information System (MidYIS) and the Performance Indicators in Primary Schools (PIPS) (see Fitz-Gibbon, 1991, 1992). These systems are important because they involve the largest databases in school effectiveness research in the UK, with a third of UK A-level results, one in four secondary schools in YELLIS and over four thousand primary schools receiving feedback each year (Reynolds *et al.*, 2000).

3.2.5. Reviews of five illustrative school effectiveness studies

The previous sections have attempted to explore the history of school effectiveness research and show how researchers in this area tried to provide an antidote to the pessimism and fatalism of the educational research of the early 1970s. After a brief presentation of first- and second-generation school effectiveness studies the expanding of school effectiveness research in a number of countries during the 1980s and the 1990s was outlined. In the current section, a number of illustrative school effectiveness studies of particular importance will be presented. These studies have been reviewed by Scheerens & Bosker (1997) in *The Foundations of Educational Effectiveness*. The review of Scheerens & Bosker (1997) is balanced and informative and manages to identify common threads among the reviewed studies with regards to their contribution to School Effectiveness. The five studies overviewed by Scheerens & Bosker are (a) the work of Brandsma (1993) in the Netherlands with the title 'characteristics of primary schools and the quality of education', (b) the *Victorian Quality of Schools Project* in Australia by Hill *et al.* (1995), (c) the *Success for All* programme of Slavin, (1996) in the United States, (d) the *Differential Secondary School Effectiveness Project* by Sammons *et al.* (1995c) in the United Kingdom, and (e) the important work of Grisay (1997) in France about the evolution of cognitive and affective development in lower secondary education.

Brandsma's (1993) study focused on the existence of differences in effectiveness between schools in the Netherlands and sought to identify the organisational characteristics that 'explain' the differences between them. Brandsma approached 252 primary schools and gathered information on Mathematics and Language achievement by means of standardised pre-and post-test at the end of grade-7 and grade-8 respectively. He also administered questionnaires to the head teacher and the teachers of the schools in order to measure variables in the domain of school context and

organisation, as well as teaching practice. It was found that the between school variance for Language and Arithmetic, adjusted for previous achievement and other student background characteristics, was 8 and 11.6 per cent respectively.

The *Victorian Quality of Schools Project* (Hill, 1995) is one of the first school effectiveness studies to use multivariate multilevel models. The main research questions in the *Victorian Quality of Schools Project* were: (a) 'what are the characteristics of schools in which students make rapid and sustained progress in English and Mathematics, after adjusting for their initial levels of achievement?' and (b) 'what are the characteristics of schools in which there are positive student attitudes and behaviours, positive perceptions by teachers of their work environment, and high levels of parent participation in and satisfaction with their child's schooling?' (Hill *et al.*, 1995: 5). In the *Victorian Quality of Schools Project*, five entire year-level cohorts of 13,909 students including their parents and teachers were selected. The sample consisted of 59 primary and 31 secondary schools and included 365 and 538 teachers respectively. The outcome measures both cognitive and non-cognitive. As regards the former, they were results of teachers' authentic assessments because there were serious reservations about the validity of the standardised achievement tests that were available with reference to the curriculum in the Victorian schools. The explanatory variables of the study included measures of students' background, like ability and socio-educational level, as well as instructional characteristics, like students' reports on the type of homework in English and Mathematics. Teachers' perceptions of their work environment were also investigated by means of a specially designed questionnaire. The statistical analysis consisted of multilevel regression models with three levels (student, classroom, and school), as well as of multilevel path analysis models (both of these statistical procedures will be explained in Chapter 4). The results of the multilevel regression analysis showed that the variance between classes, with adjustments for year level and prior achievement, were much larger than the variance between schools. This finding is summarised by Scheerens & Bosker (1997: 189) as in Table 3.2.

Table 3.2. Percentage of variance in student progress accounted for by among-classes and between schools differences in the *Victorian Quality of School Project*.

	Two-level model Between schools	Three-level model	
		Percentage of variance among classes	Percentage of variance among schools
English			
Primary	17.0	45.4	8.6
Secondary	18.2	37.8	7.4
Mathematics			
Primary	16.4	54.7	4.1
Secondary	18.9	52.7	8.4

The most interesting results of the *Victorian Quality of Schools Project* were that (a) factors that affect students progress are subject and context specific (the notion of differential effectiveness), (b) that school differences explain relatively little variance, after differences between classes have been taken into account, and (c) that the indirect effects of school-level variables when variables at class-level are taken into account are negligible.

The third study reviewed by Scheerens & Bosker (1997) is the work of Slavin in the United States with the title *Success for All*. Slavin designed a number of procedures that were based on the Educational Effectiveness knowledge base. The programme *Success for All* was a project for inner-city schools with the general aim to raise students' achievement levels mainly in Reading. The programme targeted the children in kindergartens and pre-kindergartens and involved more than 400 schools in 26 U.S. states and three other countries. About 200,000 children participated in the programme. The basic idea behind *Success for All* was that prevention and early intervention is better than cure. Thus, the teachers of *Success for All* were provided with structured curricula, classroom management and assessment procedures, as well as materials and guidelines for one to one tutoring in the class. The most important instructional principles of the reading programme were: scaffolding, co-operative learning, and direct instruction.

In an evaluation report of the *Success for All* programme, which used a quasi-experimental design, Slavin (1996) compared the results of 19 *Success for All* school with the results of other 19 control schools (matching pairs). The units of analysis were grade-level cohorts *i.e.* the students in all classes in that grade in a given year. It was found that the adjusted means for the programme cohorts in four reading tests were higher than the corresponding means for the control schools. However, the impact of *Success for All* programme in the knowledge base of School Effectiveness is much more far reaching than the finding that was just presented. Firstly, *Success for All* indicated that the structure of teaching and learning transaction in the classroom is much more important than the organisational structure of the school. This finding is important for policy makers and those who are concerned with educational change. As Scheerens & Bosker (1997) comment, the message of *Success for All* seems to be that systematic innovation and restructuring of school administration and organisation should be seen as facilitative to educational reform rather than the target of educational reform. A second message of *Success for All* is that externally developed materials and manuals have positive impact on education. This finding seems to contradict the opinion that successful school reforms come only on-site from schoolteachers themselves.

The fourth study reviewed by Scheerens & Bosker (1997) is the work of Sammons *et al.* (1995c) with the title *Differential Secondary School Effectiveness.* The study was conducted in the United Kingdom and addressed three major themes in School Effectiveness Research: (a) the size of school effect, (b) the consistency of school effects across time and school organisational sub-units, and (c) the research for explanatory process conditions of effective schooling. The study of Sammons *et al.* (1995c) was of a longitudinal character and focused on assessment results over a five-year period. It involved 94 secondary schools in 8 inner London Local Educational Authorities and 7,000 students in any one year. The project had three phases. In the first phase, school- and department-level value added outcomes were analysed. Apart from prior achievement, students' academic outcomes were adjusted for a number of background factors such as ethnicity and eligibility for free school meals. The outcome measures were total GCSE results and GCSE scores in six subjects: English, English Literature, Mathematics, French, History, and Science. In the first stage of the study it was found that only a small number of schools were consistently effective or consistently ineffective across subjects and over several years. Most schools had fairly mixed effects. In many cases, highly effective and highly ineffective departments

coexisted in the same school. The message of this finding is that confident discrimination of the schools can only be made for a small number of broadly effective and broadly ineffective institutions. Given the observed inconsistency of effectiveness between departments and subject areas, the publication of value added league tables alone does not solve the problem of identifying 'effective' and 'ineffective' schools. In other words, Sammons *et al.* (1995c) showed how complex phenomenon school effectiveness can be with regards the comparisons between schools. One year after the publication of the findings, Sammons (1996) discussed complexities in the judgement of school effectiveness in an article that appeared in the journal *Educational Research and Evaluation*. The book *Forging Links: Effective Schools and Effective Departments* by Sammons, Thomas, & Mortimore (1997) was based on the findings of the *Differential Secondary School Effectiveness* project.

The school- and department-level residuals from the statistical analysis of the *Differential Secondary School Effectiveness* were later used by the same researchers as the basis for selecting schools for detailed case studies. Three types of schools were distinguished in the statistical analysis of the residuals: (a) broadly effective schools, *i.e.* positive residuals in most of the outcomes, (b) broadly ineffective schools, *i.e.* negative residuals in most of the subjects, and (c) schools with mixed effects, *i.e.* schools with positive residuals in some of the outcomes and negative residuals in the rest of the outcomes. In the second phase of the project, in-depth qualitative case studies were carried out to the three types of schools that were presented above with the purpose of understanding their characteristics. The factors that contributed most to the effectiveness of the schools were: (a) the history of the school or the department, (b) high expectation for students' achievement, (c) entry policy and constant monitoring of student's progress, (d) shared visions and goals, (e) an effective School Management Team, (f) the quality of teaching, and (g) the involvement of the parents. Another purpose of the case studies was the development of instruments (questionnaires) for the collection of information about school and departmental processes that affect students' achievement. The questionnaires were administered to head teachers and head of departments in another quantitative phase of the project.

The multilevel analysis of this new quantitative phase identified a number of important relations between explanatory and response variables. A relation discussed in Scheerens & Bosker (1997) review is the relation between the total GCSE score and the head teacher variables. In the study of Sammons *et al.* (1995c) it was found that the total

school level variance was 7.21% of the total variance in GCSE score. This figure was reduced to 1.82% after controlling for pupil background factors and prior achievement. When process variables were added in the model, the between school variance was reduced to 0.58%. This implies that the process variables count for 68 per cent of the residual between school variance. Given the small size of between school variance, the effect of school process characteristics must be very small indeed. In conclusion, the *Differential Secondary School Effectiveness* project made an important contribution to School Effectiveness Research by revealing the size and the complexities in the effectiveness of the schools (*i.e.* differential effects for different student groups and internal variations in the departmental level).

The fifth study reviewed by Sheerens & Bosker (1997) is the work of Grisay (1997) in France. Grisay was asked by the *Direction de l' Évaluation et de la Prospective* to conduct a longitudinal study on school effectiveness in French middle schools. The researcher focused on both the cognitive and affective domain. She collected a sample of 100 schools, and in each school, a random sample of 80 pupils entering grade-6. The students, the teachers and the head-teachers of these schools were monitored for four years. Information on school processes was collected with the help of specially designed questionnaires. There was also a notable effort towards selecting comments from teachers and the other participants as well as an effort towards providing feedback. For this reason special information-exchange meetings were held on a regular basis with the teachers and the researchers together.

The findings of Grisay's (1997) study were important because they informed the French policy makers about correlates of school and classroom effectiveness, like for example, the grouping procedures and the type of instruction. Issues like the school climate and the school-parent relationship were also tapped. Grisay's data-set has later undergone many secondary analyses from other French researchers. In one such analysis Meuret (1995) used path-analytic techniques (LISREL) to investigate a number of school outcomes in the affective domain, like motivation and sociability. In another study, Meuret & Marivain (1997) used the same data-set in order to model the factors that constitute students' feeling of 'well being' in schools. Another researcher who also used Grisay's data-set was Sacré (1997), who focused on the role of the school director. Thus Grisay work in France was one of these few educational studies that initiated other studies and in the end changed people's about what is going on in schools. In the past many French researchers used to see the school exclusively from a sociological

perspective concluding either that each school's unique identity makes it incomparable with other schools (see Paty, 1980), or that schools are 'non-organisations' (see Ballion, 1991). Some other French researchers took a constructivistic perspective, claiming that the effectiveness of each school can be seen only through a school's individual objectives and that therefore no generally agreed criteria of effectiveness exist (see Derouet, 1987). Grisay's (1997) study, however, helped to see the work in schools under a different perspective.

3.2.6. Some findings from PISA 2000

The Programme for International Student Assessment (PISA 2000) is an international study that assessed literacy in Reading, Mathematics and Science. It is of course one of the landmark studies of our times in the area of educational evaluation and effectiveness. The study was co-ordinated by the governments of 32 participating countries through the Organisation for Economic Co-operation and Development (OECD). Because the results from PISA 2000 are only recently appearing, its impact has not yet been fully felt by educational researchers and policy makers around the world. The difference of the PISA 2000 from the other international comparisons of students' achievement is that PISA 2000 has investigated the reasons why some educational policies and practices at the micro level are more effective than the others. Some of these findings will be presented in the current section. More information can be found in a long book (322 pages) which contains the first results from PISA 2000 (OECD, 2001). The title of this recently published book is *Knowledge and Skills for Life.*

Table 3.3 (adapted from OECD, 2001: 257) presents the between-school and within-school variation in student performance on the reading literacy scale of PISA 2000. The variation is expressed as a percentage of the average variation in student performance across OECD countries. The last column of Table 3.3 contains the total variation between schools expressed as a percentage of the total variation within each country. For example, 50.4 per cent of the total variance in reading literacy in Greece is between schools. However, this is 'unexplained' variance. In order to find the 'net' school effect, one has to subtract the between school variance explained by geographical/systemic/institutional factors and the international socio-economic index of occupational status of students and schools (see in third from the right column). The variance accounted for by the aforementioned factors is for Greece 40.1%. Thus, the

'net' school effect for Greece is 10.3% (50.04% – 40.1%). This figure is very large for such a centralised educational system as the Greek one, which serves a mono-cultural society. The corresponding figure for the United Kingdom – a country with decentralised educational system – is only 4.3%. The OECD average is 5.6%.

Table 3.4 and Table 3.5 (both adapted from OECD, 2001: 312) present the effects of student-level and school-level factors on performance the reading and mathematics literacy scales, for all OECD countries combined. Model 1 presents the impact of school factors, Model 2 the impact of family background, and Model 3 the joint impact of school factors and family background. It can be seen that the most important correlate of student achievement both in reading literacy and mathematics literacy scale is schools' intake (the 'school mean index of economic, social and cultural status'). The first findings from PISA 2000 have just been published and it is relatively early for the policy makers and those who work in the fields of educational effectiveness and evaluation to respond. However, in current researcher's opinion, the results of PISA 2000 – and more importantly the results of the forthcoming PISA 2003 – will have a tremendous impact not only on educational policies but also on what is being taught in educational department all over the world.

Table 3.3. Between school and within school variation in student performance on reading literacy scale (OECD, 2001: 257).

Countries	Total variation in SP	Variation expressed as a percentage of the average variation in student performance (SP) across OECD countries											Total variation between schools expressed as a percentage of the total variation within the country
		Total variation in SP as a percentage variation in student performance across OECD countries	Total variation in SP between schools	Total variation in SP within schools	Variation explained by the international socioeconomic index of occupational status of students		Variation explained by the international socioeconomic index of occupational status of students and schools		Variation explained by geographical / systemic / institutional factors		Variation explained by geographical and schools/ systemic / institutional factors and the socieconomic index of occupational status of students and schools		
					Between-school variation explained	*Within-school variation explained*	*Between-school variation explained*	*Within-school variation explained*	*Between-school variation explained*	*Within-school variation explained*	*Between-school variation explained*	*Within-school variation explained*	
Australia	10357	111.6	20.9	90.6	8.3	6.7	14.2	6.9	1.8	0.1	15.0	7.0	18.8
Austria	8649	93.2	68.6	45.7	10.4	0.4	42.6	0.3	60.4	0.0	61.6	0.5	60.0
Belgium	11455	123.5	76.0	50.9	11.0	1.8	44.2	1.9	50.7	0.0	61.9	1.9	59.9
Canada	8955	96.5	17.1	80.1	4.6	5.0	7.8	5.1	1.1	0.0	8.4	5.1	17.6
Czech Republic	9278	100.0	51.9	45.3	8.8	1.8	34.4	1.8	44.5	0.0	46.8	1.8	53.4
Denmark	9614	103.6	19.6	85.9	10.2	8.0	11.6	8.1	m	m	m	m	18.6
Finland	7994	86.2	10.7	76.5	1.5	4.6	1.7	4.6	m	m	m	m	12.3
France	m	m	m	m	m	m	m	m	m	m	m	m	m
Germany	12368	133.3	74.8	50.2	11.7	2.3	51.5	2.3	65.2	0.0	66.9	2.3	59.8
Greece	9436	101.7	53.8	52.9	7.0	1.1	25.0	1.1	33.3	0.0	40.1	0.4	50.4
Hungary	8810	95.0	71.2	34.8	8.3	0.3	49.4	0.2	52.5	0.0	58.7	0.1	67.2
Iceland	8529	91.9	7.0	85.0	1.6	5.0	1.7	5.0	0.9	0.0	2.3	5.0	7.6
Ireland	8755	94.4	17.1	79.2	5.5	5.7	10.1	5.7	9.7	0.0	12.7	5.5	17.8
Italy	8356	90.1	50.9	43.4	3.4	0.5	23.8	0.5	27.6	0.0	30.1	0.5	54.0
Japan	7358	79.3	36.5	43.9	m	m	m	m	m	m	m	m	45.4
Korea	4833	52.1	19.7	33.0	1.0	0.2	7.1	0.2	10.9	0.0	12.0	0.2	37.4
Luxembourg	10088	108.7	33.4	74.9	11.1	8.3	26.7	8.2	m	m	m	m	30.8
Mexico	7370	79.4	42.9	37.4	5.2	0.1	25.7	0.1	26.5	0.0	35.3	0.1	53.4
New Zealand	11701	126.1	20.1	103.9	7.3	10.9	11.6	11.0	12.9	0.0	14.8	11.0	16.2
Norway	10743	115.8	12.6	102.4	3.7	8.7	4.9	8.7	0.5	3.8	5.2	10.1	10.9
Poland	9958	107.3	67.0	38.9	6.3	1.1	42.4	1.1	53.0	0.0	55.9	1.1	63.2
Portugal	9436	101.7	37.5	64.3	10.6	4.6	23.8	4.6	m	m	m	m	36.8
Spain	7181	77.4	15.9	60.9	5.4	3.0	9.1	3.1	6.2	0.0	10.9	3.1	20.7
Sweden	8495	91.6	8.9	83.0	4.5	6.9	5.8	6.9	2.7	2.6	6.9	8.1	9.7
Switzerland	10408	112.2	48.7	63.7	12.7	4.0	24.3	3.9	22.1	0.0	29.7	4.1	43.4
United Kingdom	10098	108.9	22.4	82.3	9.6	8.4	16.0	8.7	7.3	0.0	17.1	6.7	21.4
United States	10979	118.3	35.1	83.6	12.0	5.6	25.5	5.8	m	m	m	m	29.6
OECD average	**9277**	**100.0**	**36.2**	**65.1**	**7.3**	**4.2**	**21.6**	**4.2**	**24.5**	**0.3**	**29.6**	**3.7**	**35.2**
Non-OECD Countries													
Brazil	7427.0	80.1	35.8	47.1	6.5	1.9	19.7	2.1	5.3	0.0	21.7	2.1	43.1
Latvia	10434.6	112.5	35.1	77.5	4.9	4.4	16.7	4.5	m	m	m	m	31.2
Liechtenstein	m	m	m	m	m	m	m	m	m	m	m	m	43.9
Russian Federation	8465.8	91.3	33.6	57.1	4.8	2.4	15.4	2.3	16.6	0.0	21.0	2.3	37.1

Table 3.4. Effects of student-level and school-level factors on reading literacy (OECD, 2001: 312).

		Reading literacy scale						Mathematics literacy scale					
		Model 1		Model 2		Model 3		Model 1		Model 2		Model 3	
	Increase	Effect	S.E.	Effect	S.E.	Effect	S.E.	Effect	S.E.	Effect	S.E.	Effect	S.E.
Family background and student characteristics													
Student-level index of economic, social and cultural status	1 unit			**20.1**	(2.07)	**20.1**	(2.07)			**19.3**	(1.76)	**19.3**	(1.76)
Student-level index of economic, social and cultural status squared				**-1.7**	(0.34)	**-1.7**	(0.35)			**-1.2**	(0.45)	**-1.2**	(0.44)
School mean index of economic, social and cultural status	1 student-level unit			**67.5**	(6.48)	**56.6**	(5.41)			**62.8**	(6.97)	**52.7**	(5.76)
Student is female				**25.5**	(1.97)	**25.0**	(2.03)			**-16.2**	(1.56)	**-16.8**	(1.60)
Student is foreign-born				**-23.2**	(2.87)	**-23.1**	(2.88)			**-21.1**	(3.78)	**-21.5**	(3.85)
School resources													
Student-teaching staff ratio	-1 student	3.0	(1.58)			1.1	(0.64)	2.3	(1.43)			0.8	(0.59)
Student-teaching staff ratio squared		**-0.1**	(0.03)			0.0	(0.01)	-0.1	(0.03)			**0.0**	(0.01)
Student-teaching staff ratio is greater than 50		-27.8	(14.98)			**-18.6**	(11.60)	**-26.0**	(11.20)			-16.9	(10.35)
School size	100 students	**4.8**	(1.21)			**1.5**	(0.51)	**4.1**	(1.28)			**1.3**	(0.63)
School size squared		**-0.1**	(0.05)			0.0	(0.02)	**-0.1**	(0.05)			0.0	(0.03)
Percentage of computers at school available to 15-year-olds	1 percentage point	-0.1	(0.19)			0.0	(0.13)	-0.3	(0.20)			-0.2	(0.14)
Percentage of teachers in school with a university tertiary-level qualification with a major in the respective subject domain	1 percentage point	**0.4**	(0.08)			**0.2**	(0.04)	**0.3**	(0.05)			**0.1**	(0.03)
Percentage of teachers in school participating in professional development programmes	1 percentage point	**-0.1**	(0.03)			**-0.1**	(0.01)	**-0.1**	(0.03)			**-0.1**	(0.02)
Index of the quality of the schools' physical infrastructure*	1 unit	1.2	(1.16)			0.9	(0.65)	1.7	(1.10)			**1.3**	(0.62)
Index of students' use of school resources*	1 unit	**18.3**	(3.30)			**9.1**	(1.84)	**20.0**	(3.38)			**10.7**	(2.02)
School policy and practice													
Index of the use of formal student assessments*	1 unit	-0.1	(0.90)			0.9	(0.83)	1.5	(1.12)			1.9	(1.33)
Index of teacher-related factors affecting school climate*	1 unit	**6.3**	(1.92)			1.6	(0.96)	**5.6**	(2.02)			1.4	(1.19)
Index of the principals' perceptions of teachers' morale and commitment*	1 unit	**2.2**	(0.95)			-0.4	(0.55)	**2.1**	(0.82)			-0.4	(0.57)
Index of teacher autonomy*	1 unit	-1.3	(1.30)			-0.1	(0.82)	-1.5	(1.27)			-0.3	(0.88)
Index of school autonomy*	1 unit	**4.9**	(1.48)			-0.1	(0.76)	**4.2**	(1.35)			-0.1	(0.81)
Classroom practice													
Index of the use of informal student assessments*	1 unit	-1.6	(1.00)			**-1.1**	(0.55)	-1.2	(0.93)			-0.9	(0.63)
Index of teacher-student relations*	1 unit	**18.0**	(1.73)			**10.1**	(1.07)	**14.7**	(1.96)			**8.9**	(1.09)
Index of disciplinary climate*	1 unit	**10.5**	(1.79)			**7.0**	(1.16)	**9.2**	(1.66)			**6.4**	(1.08)
Index of achievement press*	1 unit	**3.8**	(2.50)			2.1	(1.31)	3.2	(2.71)			1.3	(1.54)
Percentage of variance explained													
Students within schools		0.0		**12.4**		**12.4**		**0.0**		**11.0**		**11.2**	
Schools within countries		**31.0**		**66.1**		**71.9**		**28.3**		**62.0**		**67.8**	
Between countries		**20.8**		**34.3**		**43.4**		**21.8**		**26.0**		**32.2**	

Note: * these indices have standardised to have a mean 0 and a standard deviation of 1.
Effects marked in bold are statistically significant in 0.05 level.

Table 3.5. Effects of student-level and school-level factors on mathematics literacy (OECD, 2001: 312).

		Scientific literacy scale					
		Model 1		Model 2		Model 3	
	Increase	Effect	S.E.	Effect	S.E.	Effect	S.E.
Family background and student characteristics							
Student-level index of economic, social and cultural status	1 unit			**19.3**	(1.94)	**19.3**	(1.95)
Student-level index of economic, social and cultural status squared				**-0.8**	(0.42)	-0.8	(0.42)
School mean index of economic, social and cultural status	1 student-level unit			**65.4**	(6.78)	**54.9**	(5.62)
Student is female				**-5.2**	(1.67)	**-6.0**	(1.76)
Student is foreign-born				**-25.6**	(3.87)	**-25.9**	(3.90)
School resources							
Student-teaching staff ratio	-1 student	2.8	(1.59)			1.2	(0.70)
Student-teaching staff ratio squared		**-0.1**	(0.03)			0.0	(0.02)
Student-teaching staff ratio is greater than 50		**-35.0**	(13.71)			**-26.9**	(10.54)
School size	100 students	**4.0**	(1.25)			1.0	(0.61)
School size squared		-0.1	(0.05)			0.0	(0.03)
Percentage of computers at school available to 15-year-olds	1 percentage point	-0.2	(0.19)			-0.1	(0.12)
Percentage of teachers in school with a university tertiary-level qualification with a major in the respective subject domain	1 percentage point	**0.3**	(0.07)			**0.1**	(0.04)
Percentage of teachers in school participating in professional development programmes	1 percentage point	**-0.1**	(0.03)			**-0.1**	(0.01)
Index of the quality of the schools' physical infrastructure*	1 unit	1.4	(0.99)			1.2	(0.65)
Index of students' use of school resources*	1 unit	**18.6**	(3.23)			**9.9**	(1.86)
School policy and practice							
Index of the use of formal student assessments*	1 unit	0.5	(1.00)			1.4	(1.04)
Index of teacher-related factors affecting school climate*	1 unit	**5.1**	(1.79)			0.5	(0.94)
Index of the principals' perceptions of teachers' morale and commitment*	1 unit	**3.1**	(1.01)			0.3	(0.57)
Index of teacher autonomy*	1 unit	-1.0	(1.14)			0.2	(0.68)
Index of school autonomy*	1 unit	**4.8**	(1.30)			0.4	(0.80)
Classroom practice							
Index of the use of informal student assessments*	1 unit	-1.2	(0.97)			-0.9	(0.65)
Index of teacher-student relations*	1 unit	**16.5**	(1.96)			**10.1**	(1.12)
Index of disciplinary climate*	1 unit	**10.5**	(1.73)			**7.0**	(1.22)
Index of achievement press*	1 unit	2.2	(2.50)			1.2	(1.40)
Percentage of variance explained							
Students within schools		**0.0**		**10.7**		**10.7**	
Schools within countries		**29.4**		**62.6**		**69.0**	
Between countries		**20.2**		**8.3**		**15.6**	

Note: * these indices have standardised to have a mean 0 and a standard deviation of 1.
Effects marked in bold are statistically significant in 0.05 level.

3.3. CRITICISM OF SCHOOL EFFECTIVENESS

From what has been discussed so far in this chapter, it is obvious that School Effectiveness has been a catalytic research movement for more than 20 years. Barber & White (1997) are right to argue that 'it is hard to think of another example of a body of research having such a powerful impact on the education service since the War' (p. 1). However, where there is research there is critique. Some of the critics of school effectiveness research are supportive. Others, however, are very antagonistic and reject school effectiveness completely. As school effectiveness lies at the heart of the current work, basic criticism of it has to be presented and dealt with.

One of the charges made against School Effectiveness is that the researchers who work inside this paradigm do not respond to criticism. Allegedly, this is done either by ignoring criticism, or downplaying it, or not being consistent in confronting it, or by accepting it with the promise of future improvements (Thrupp, 2001). In this chapter the basic points against school effectiveness research are presented together with a number of counterpoints. The issue of criticism, however, is large and in a way context-specific. Indeed, if one browsed the special issue of the journal *School Effectiveness and School Improvement* (volume 12, part 1), which is dedicated to the issue of criticism of school effectiveness, he or she would get the impression that criticism is an exclusively British issue. Teddlie & Reynolds (2001) recognise three strands of criticism against school effectiveness: political, methodological, and theoretical. The current author will keep Teddlie & Reynolds' (2000) classification.

3.3.1. POLITICAL CRITICISM

Political criticism of School Effectiveness Research (SER) is the most serious. In the domain of policy, there are some authors who claim that School SER has failed to control the political use of its findings (Thrupp, 2001). Indeed, it is true that in many cases politicians have used SER findings in a way which has hurt teachers' morale. The most serious accusation from a political point of view, however, is that SER has been supporting Right-wing policies – especially in the United Kingdom – and has been promoting social engineering through education. Mortimore & Sammons (1997) have strongly denied such 'unfair accusations', as they characterise them, and challenged

those who support them either to provide evidence for these criticisms or withdraw them. Regarding the argument that SER is supportive of Right-wing policies, the issue has been put onto a theoretical basis by Whitty *et al.* (1998) as follows:

> Both the New Right and the school effectiveness body take the discursive repositioning of schools as autonomous self-improving agencies at face value, rather than recognising that, in practice, the atomisation of schooling too often merely allows advantaged schools to maximise their advantages (Whitty *et al.*, 1998: 13)

Willmott (1999) goes further and claims that SER is ideologically committed to conservative social philosophy. As he writes:

> The defense of the accusation of 'ideological commitment' consist in an elucidation of the relationship between the social ontology that positivist methodology presupposes and its implications for social policy. It has been argued that positivist ontology is congruent with specific constituent elements of Conservative social philosophy. (...) Indeed, what is distinctively ideological about the research is the ways in which it lends credence to, and informs, policies which place the burden of 'improving' schools squarely on teachers' shoulders, thus concealing the reality of structured inequalities that necessarily delimit the extent to which 'improvement' can take place (Willmott, 1999: 266)

Agnus (1993) similarly writes that School Effectiveness advocates an 'isolationist's apolitical approach' to education in which it is assumed that educational problems can be fixed by technical means. 'The School Effectiveness Research tradition – Angus (1993) argues – advocates that inequality can be managed within the walls of schools and classrooms, provided that teachers and pupils follow correct effective school procedures' (p. 343). Similarly, for Morley & Rassool (1999), School Effectiveness is not a neutral scientific device but is saturated in power relations. Finally, for Fielding (1997) both School Effectiveness and School Improvement paradigms are 'importantly flawed' because, as he argues, they do not deal with the dilemmas and possibilities facing education in and for democracy at the end of the 20th century.

As regards the accusation that School Effectiveness is a kind of social engineering, much criticism can be found in the book *School Effectiveness for Whom* which has been edited by Slee *et al.* (1998). In this book, Hamilton *et al.* (1998) claim that School Effectiveness Research lends support to a functionalistic view of social engineering and is nothing more than the implementation of the ideas of Taylor and Adams about Scientific Management in schooling. Hamilton (1998) accuses School Effectiveness of

being 'an ethnocentric pseudo-science that serves merely to mystify anxious administrators and marginalise uncertain practitioners' and goes on to accuse School Effectiveness of being 'social Darwinist and eugenic ... standing at the intersection of educational research and social engineering' (p. 13). Lingard, Ladwig, & Luke (1998) also support the idea that School Effectiveness Research is a form of social engineering. The authors claim that 'better outcomes (effectiveness) and better proof of outcomes are expected of a less-funded schooling system' (p. 78). According to the same authors (*op. cit.*), the School Effectiveness literature 'is founded on a narrative about the success of the technological quantification'. The managerial model which is claimed to be advocated by School Effectiveness theorists and researchers is, according to Lingard *et al.* (1998) that of 'steering from a distance', that is a managerial model which advocates self-monitoring, local self-regulation, local reporting and discursive self-reconstruction. These qualities, according to the authors (*op. cit.*), are the characteristics of a managerial model that is mostly found in the modern Japanese car industry. Lingard *et al.* (1998) thus argue that School Effectiveness brings 'toyotism' into education. Morley & Rassool (1999) support similar ideas about the 'japanisation' (*sic*) of education in the British Islands. They argue that School Effectiveness Research has gradually distanced itself from its initial focus which has been the pursuit of equity and social justice. The same authors also point to the 'irrationality' of exporting the school effectiveness research paradigm to developing countries (*op. cit.*).

It is very difficult indeed for any researcher in the area of School Effectiveness to answer all of the criticisms made in the political and philosophical domain. What however makes the response to the criticism more difficult is that the criticism seems to be specific to the British educational context and couched in highly emotive language. In Greece, for example, there is no precedent of work in school effectiveness and therefore there is no precedent of criticism. A powerful defence against criticism is the contribution of Teddlie & Reynolds (2001) in the journal *School Effectiveness and School Improvement* (vol. 12, part 1). Teddlie & Reynolds (2001) answer criticisms presented in the previous paragraph by pointing out that there is a wide diversity of school effectiveness research internationally. The authors (*op. cit.*) name three major strands of this research after Reynolds & Teddlie (2000b): (a) school effects research, (b) effective school research, and (c) school improvement research. According to Teddlie & Reynolds (2001), in school effects research studies, the researchers investigate the scientific properties of school effects as they evolve from simple input-

output studies to studies that use complex multilevel models. Effective schools research is concerned with the processes of effective schooling evolving from case studies of 'outlier' schools through to more complex contemporary studies merging qualitative and quantitative methods in the simultaneous study of classrooms and schools. Finally, school improvement research examines the processes whereby schools can be changed using increasingly sophisticated models that have gone beyond simple applications of school effectiveness knowledge to sophisticated 'multiple level' models (*op. cit.*: 48). The same authors also list a number of sub-branches of these three areas of school effectiveness. For example, it is argued that as many as seven different scientific areas exist within school effect research paradigm and nine areas exist within the effective schools research paradigm (*op. cit.*). Thus, the first counterpoint to the criticisms which were presented in the previous paragraph is that School Effectiveness Research must not be treated as a monolithic area of enquiry; many strands exist under its umbrella and therefore SER cannot be validly accused of 'social engineering' and 'japanisation'.

With regard to the accusations that School Effectiveness Research has had a pervasive impact on educational policy making, and that researchers in the school effectiveness paradigm have been unable to control negative uses of their findings by policy makers, Teddlie & Reynolds (2001) argue that 'the symbiotic relationship between educational policy making and school effectiveness has been overstated by the critics' (p. 50). The authors present the example of the Netherlands and the United States, where a flourishing school effectiveness research knowledge base has been ignored for years by politicians. However, the most savage political criticism against School Effectiveness Research has been the view that it gives support to Right-wing policies. In the current researcher's opinion such criticism is unfair. Upon this Townsend (2001) responds to a similar criticism by Thrupp (2001) and gives a more personal tone to his answer:

> As a researcher who has felt the wrath of a right-wing government (Victoria's Kennett government of 1992-1999) and was banned from doing research in public schools for 4 years, I feel somewhat unhappy about the tone that this argument takes. It suggests that research that has been undertaken in many parts of the world is somehow tainted because it was funded by governments not of the political persuasion of Dr. Thrupp. Yet it is obvious that there have been many advances in our knowledge about children and their learning that has come as a product or research that has spanned governments of different persuasions and levels of support (Townsend, 2001: 124).

3.3.2. Epistemological and methodological criticism

Epistemology is a branch of philosophy concerned with the nature of knowledge, its possibility, scope, and general basis (Hamlyn, 1995). Methodology, on the other hand, is the study of the methods. In an attempt to summarise criticisms of school effectiveness research methodology, Jensen (1995) listed the following 11 points: (1) sample bias, (2) definition problems, (3) narrow outcome measures, (4) inadequate control of background characteristics, (5) inappropriate comparisons between schools and students, (6) various methodological limitations, (7) the aggregation of achievement data, (8) not enough levels of analysis, (9) observer bias, (10) theoretical weaknesses, and (11) problems in causal ordering (Jensen 1995: 187). Another example of theoretical criticism has been provided by Chitty (1997) who has argued that School Effectiveness Research may have provided an antidote to the pessimism and fatalism of the 1970s but today it is deficient in four important respects. Firstly, it places too much emphasis on the notion of progressive school management as the dynamic of change; secondly, it fails to take full account of the characteristics of the education system as a whole; thirdly, it shows little regard for the issues of social class; fourthly, it has little to say about issues of curriculum content and pedagogy.

From an epistemological perspective, some critics doubt whether the mathematical models of school effectiveness can 'explain' reality. Slee & Weiner (1998) wrote that the School Effectiveness Research movement is undermined by epistemic and methodological reductionism because, as they argued, 'it bleaches the context from its analytic frame' (p. 8). Agnus (1993) argues that the methodology of SER is 'a technicist common sense approach that fails to understand or explain the complex notion of what counts as educational practice' (p. 335). The same author goes on to accuse School Effectiveness Research of being 'naively positivistic'. 'There is – Agnus (1993) argues – an attempt to establish a mathematical connection between statistically equalised pupils and their performance'. He also argues that:

> There is no sense of how the relationship (between statistically equalised pupils and their performance) works. The correlations can be said to build into a systematic theory only because, as Seddon (in press) explains, such standard view positivist propositions are regarded as true if they correspond with the facts (Angus, 1993: 341).

Another epistemological criticism of School Effectiveness comes from Scott (1997), who points out the 'missing hermeneutical dimension' in School Effectiveness. 'Hermeneutics' derives from the name of Hermes, the messenger of the Greek gods who gave rise to *hermeneuein i.e.* the act of interpreting or understanding other people or texts. Scott (1997) claims that School Effectiveness works with a 'technical rationalist' view of pedagogy. However, he argues, social (and educational) research is mainly hermeneutical. What goes on in schools, Scott (*op. cit.*) states, cannot be captured by mathematical models, appropriate only to closed systems. To interpret correlation as causal mechanisms is, according to Scott (1997), an 'ontic fallacy'.

On this kind of criticism, Teddlie & Reynolds (2001) argue that whilst many researchers in the area of School Effectiveness work primarily within the postpositivistic tradition[1], many others are pragmatists and enter into discussions regarding paradigms in School Effectiveness Research from that viewpoint. In fact, an analysis of the opinions of those who work in the area of School Effectiveness (Teddlie, Reynolds, & Pol, 2000a) has shown that there are three types of researchers from a methodological point of view: (a) 'scientists', who investigate the scientific properties of school effects, (b) 'humanists' who are affiliated with more applied school improvement studies and are interested in the improvement of practice more than the generation of research knowledge, and (c) 'pragmatists' who are interested in effective schools studies for the implications of those studies to school improvement. Lauder *et al.* (1998) proposed a combination of qualitative and quantitative research methods in SER. As they suggest:

> Quantitative study would seek to establish over time the impact of markets on school performance. (...) Where schools in similar circumstances perform differently according to several indicators, these would be investigated qualitatively (Lauder *et. al.*, 1998: 65).

The need for qualitative methodology in SER has also been supported by Elliot (1996) who, after claiming that the School Effectiveness tradition has adopted a 'mechanistic methodology', compares the use of quantitative research with the use of small scale detailed action research projects. The view of the current author is that in order to see what is going on in a school, one has to use both quantitative and qualitative research methods.

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[1] The notions of positivism and post-positivism are presented in Section 4.1.

Many school effectiveness researchers in fact adopt mixed methods combining quantitative and qualitative approaches. Philosopher Richard Pring, who in the past has offered constructive critiques of SER (see Pring, 1995), stresses in his book *The Philosophy of Educational Research* (2000) that the notional gap between quantitative and qualitative research is, in fact, false. Pring (2000) argues that the opposition between quantitative and qualitative research is mistaken. He also draws a fine line between qualitative and quantitative research methods and offers a cautionary note to the researchers who work within the school effectiveness paradigm:

> Behind the criticism of quantitative research lies an understandable suspicion of those who sponsor research and use its results in the interest of management. It is worth pointing out vigorously that educational arrangements are increasingly organised to serve economic and social interests as these are conceived by political leaders and that, in pursuing these ends, such leaders ask us to manage schools in the light of what research concludes to be the most 'effective' way of achieving them. It is equally true and worth pointing out that such research, in ignoring the complex transactions which take place between teacher and learner and which can not be captured in the management, means-end language of that research, distorts those educational transactions, and 'disempowers' and 'disenfranchises' (Guba and Lincoln's words) the teachers (Pring, 2000: 54).

In a critique of the mainstream paradigm of School Effectiveness Research, Lauder *et al.* (1998) compared two models of how schools work and presented these two models' implications for the methodology of School Effectiveness. The authors compared what they named the 'Received Model' of School Effectiveness, *i.e.* the mainstream tradition of School Effectiveness Research, with what they named the 'Heretical Model', *i.e.* the views according to which the schools are too complex organisations for judgements of their effectiveness to be valid. According to Lauder *et al.* (*op. cit.*) the Received Model, embraces a 'reductionist' view of the aims of schooling and 'through default, if not design, buys into the prevailing government orthodoxy that the quality of schooling can be measured, almost exclusively by test and exam performance' (*op. cit.*: 56). Lauder *et al.* (1998) criticised also the Heretical Model. According to the authors (*op. cit.*) with the Heretical Model 'we can neither know why some schools are effective and others not, nor can we engineer good stable school structures and practices'. In order to overcome the dilemma between the Received and Heretical Model, Lauden *et al.* (1998) proposed a third model: the 'Contextual Model' of school effectiveness. This model, according to its proponents, is epistemologically placed between the 'abstracted

empiricism' of the Received Model and the 'particularism' of the Heretical Model (*op. cit.* p. 66).

For Teddlie & Reynolds (2001) the Contextual Model which has been proposed by Lauder *et al.* (1998) is not unknown to researchers in the school effectiveness paradigm because as many studies have used qualitative research methods in the past and have investigated contextual characteristics of the schools. With regard to the contextual factors which need to be controlled for in studies of school effects, Teddlie & Reynolds (2001) argue that

> Instead of ignoring context variables, many School Effectiveness researchers have explicitly included context variables in their research. While our critics consider socioeconomic status to be 'the' context variable, School Effectiveness researchers have studied several context variables (Teddlie & Reynolds, 2001: 57).

Another methodological criticism of School Effectiveness Research comes from Hill (1998), who has argued that it is unlikely that a single, definitive School Effectiveness study will ever be undertaken. 'This fact – Hill (1998) continues – gives rise to the conclusion that the current paradigm within which school effectiveness research has been undertaken has outlived its usefulness' (*op. cit.*). Hill (1998) goes on to present three negative points of the current School Effectiveness Research paradigm. The first point is that School Effectiveness has little connection with what happens in schools today. Most of the school effectiveness research, Hill (*op. cit.*) claims, has followed a 'top – down' design and has been driven by the theoretical concerns and agendas of the researchers failing thus to make meaningful connections with schools. On the second point Hill (1998) claims that School Effectiveness has had a very narrow agenda, mainly because it has been historically focused only on students' academic learning, especially on literacy and mathematics. Such an accusation is also given by Stoll & Fink (1996), according to whom an effective school cannot be judged only by its pupils' ability to read, write and be numerate. The authors (*op. cit.*) state that the researchers in the field of school effectiveness do not measure the full range of learning experiences offered by schools nor do they tell anything useful about the development of pupils as future members of society. However, it could be argued that numeracy and literacy are fundamental requirements for participating in a democratic society. In addition, many school effectiveness studies have looked at both cognitive and affective outcomes (see, for example, the *Fifteen Thousand Hours* by Rutter, *et al.*, 1979).

According to Hill (1998), the current school effectiveness research paradigm has not focused adequately on the effect that specific interventions and improvement initiatives have on schools. By focusing only on the natural variation among and within schools, Hill (*op. cit.*) continues, school effectiveness researchers only measure 'what is' and not 'what could be' (*op. cit.*). The narrow focus of much of the research on the effectiveness of schools is, according to Hill, another indication that School Effectiveness Research has little relevance to what is actually been taught at school. The third point of Hill's criticism is that the studies which are carried out within the current school effectiveness framework have employed weak research designs and have produced findings that are general and tentative. The current paradigm, Hill argues, has not found a satisfactory way of dealing with school change over time and, as a consequence, has little to say about the causes of effectiveness.

Hill is right to refer to the 'top-down' design of the School Effectiveness Research as well as the lack of research in the causes of effectiveness. However, the issue of the narrow focus and the change in school effects over time have already been addressed by researchers who work in the School Effectiveness Research paradigm (see points 1 to 4 in page 93 of the current work). As regards the critique that researchers in the area of school effectiveness measure the natural variation in schools ('what is') and not 'what could be', a possible explanation could be that School Effectiveness cannot be expected to trigger new educational policies more than is expected from other areas of educational research. However, there are examples of research in School Effectiveness that have followed experimental research designs and have measured 'what could be' in the schools. One such study is the work of Brandsma *et al.* (1995) in the Netherlands, in which experimental work was conducted in order to compare school-level and classroom-level determinants of mathematics achievement in secondary education. In addition, the work which is being conducted in the area of instructional effectiveness by Creemers and his colleagues in the Netherlands could be classified as a comparison between 'what is' (traditional instruction methods) and 'what could be' (constructivistic approach to learning).

3.3.3. Internal criticism

The criticisms that have been presented so far in Section 3.3 are mostly external criticisms. There are, however, internal criticisms of School Effectiveness Research which have been raised by key scholars in this academic area. These criticisms are

important because they are in fact insiders' view of the case of school effectiveness. In one such internal critique, Scheerens *et al.* (2001) deal with a number of important issues within SER like the issues of context, alternative perspectives on learning, and the use of Information and Communication Technology (ICT) in schools. This critique has been published in the special issue of *School Effectiveness and School Improvement* (vol. 12, part 1).

Scheerens *et al.* (2001) attempt to restore the true picture of School Effectiveness Research by explaining what SER is about and what it is not. They later go on to defend School Effectiveness Research against the criticism which was presented in Section 3.3.1. According to the authors, School Effectiveness is about 'instrumental rationality (how to do things right)' and not so much about 'substantive rationality (how to do the right things)' (p. 132). Scheerens *et al.* (2001) admit that researchers in the area of School Effectiveness are making political choices but, as they argue, this is not necessarily a defect or as important as presented by external critics. The researchers in the realm of School Effectiveness, Scheerens *et al.* (2001) state, focus on the study of basic skills or examination results for which there is a fair degree of agreement about their practical importance.

Another point of criticism which Scheerens *et al.* (2001) react to is the accusation that SER has ignored the social context. Upon that, the authors present two lines of defence. Firstly, they stress the importance of the school effect on students' achievement by comparing it with the contribution of other societal factors. The general finding that schools account for, say, only 15 per cent of the variation in students' achievement, does not mean that societal factors account for the remaining 85 per cent. In fact, the contribution of a school can be much higher from a statistical point of view and much more important from a substantial point of view, mainly because:

(a) this 15% does not include either the variation which can be found at lower levels, like departments and individual teachers or the interaction between the levels;
(b) the aforementioned percentage is based on the relative distance between 'good' and 'bad' and says nothing about the true contribution of the educational system which for some subjects can be very high indeed;
(c) in fact, the best predictor of student performance is not their socio-economic status but past performance or aptitude.

Scheerens *et al.* (2001), however, rise above the criticisms which target the allegedly ignorance of social context from the researchers within SER. Scheerens *et al.* (*op. cit.*) not only discuss contextual effects in the form of an exemplary mathematical formula but also consider the effects of school composition on student achievement (see Figure 3.1, below).

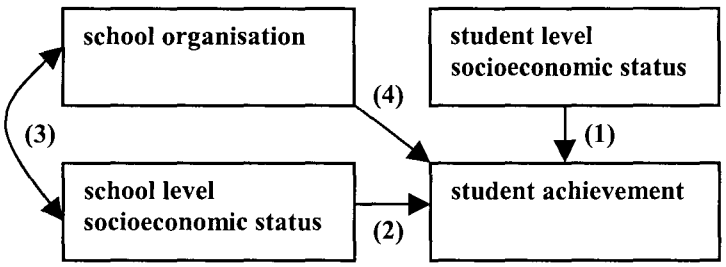


Figure 3.1. Contextual effects and school organisational effects on student achievement (from Scheerens *et al.* 2001: 136).

According to Scheerens *et al.* (2001), if schools have their own policies for student enrolment, the effect of the socioeconomic status of student achievement is not direct. In fact, the effect of socioeconomic status is represented by arrows 1 and 2, the latter being associated with variables that have to do with the organisation of the school. The decomposition of the total effect of school organisation on student achievement would thus require the estimation of the structural coefficients indicated by arrows 2, 3, and 4.

Scheerens *et al.* (2001) in their 'self-criticism' deal with other issues including (a) the need for 'state of the art' studies on foundational SER issues, (b) the need for more studies that focus on the teaching and learning transaction, (c) the use of Information and Communication Technology in the schools, and (d) the relation of SER to educational policy in the area of decentralisation and accountability. Scheerens *et al.* (2001) refer to the relation between School Effectiveness and school self-evaluation. In the same article they inform their readers that they have been active in developing instruments for school self-evaluation inspired by the factors that constitute part of the knowledge base on school effectiveness. This is also the purpose of the current thesis. It is hoped that the present study, which explores SER in the Greek context, will contribute to the further development of approaches to the study of variation between secondary schools and their impact on students.

3.4. EFFECTIVE SCHOOL CONDITIONS

As it has been already stated, school effectiveness research findings and methods lie on the heart of the current thesis. The aim of this section is to present SER findings on the topics that will be investigated in the Greek context. The literature on School Effectiveness Research findings is rich and, therefore, it is important to divide the literature into lines of inquiry. For this purpose a number of efforts have be done in the past. Clark *et al.* (1984) for example, categorised the body of the School Effectiveness literature into two parts: the literature on 'instructionally effective schools' and the literature of 'school improvement'. Purkey & Smith (1983) in their review distinguished four groups of school effectiveness research: (a) 'outlier studies', (b) 'case studies', (c) 'programme evaluations', and (d) 'other studies'. A third categorisation is provided by Ralf & Fennessey (1983), who distinguished two categories of School Effectiveness studies: (a) the study of effective schools and (b) the study of school effects. The scope of the current thesis falls into Ralf and Fennessey's (1983) second category: the study of school effects. The presentation will start with lists of effective schools' conditions.

3.4.1. LISTS OF EFFECTIVE SCHOOL CONDITIONS

Lists of effective schools' conditions are sets of factors that, as research has indicated, are associated with the effectiveness of the school. The older list of effective school condition can be found in the work of Edmond (1979) which was presented earlier in Section 3.2.1. The five effectiveness conditions of Edmonds (1979) were: (a) strong educational leadership, (b) high expectations of student achievement, (c) an emphasis on basic skills, (d) a safe and orderly climate, and (e) frequent evaluation of pupil progress. Lists, which in a way summarised some important educational and school effectiveness characteristics, were very popular among researchers in the past because they epitomised the school effectiveness knowledge base and could easily be disseminated to policy makers, schoolteachers and inspectors. Soon, however, the lists of effective schools conditions received a lot of criticism. For example, OECD experts warned that 'compilations of such lists unfortunately still fail to provide us with the means fully to understand the complex interplay of factors and the means whereby effectiveness may be enhanced (OECD, 1994: 14).

Nowadays, the lists of effective school conditions have been used by the same critics to undermine all research that is being conducted inside the SER paradigm. Hoy *et al.*, (2000), for example, argue that 'it is now widely acknowledged that most "effective" schools display five or six characteristics which most of us could write down without much thought on the back of an envelope' (p. 5). On the other hand, lists with effective schools characteristics can be useful in some cases. As Sammons & Reynolds (1997) answered to Elliot's (1996) criticism, many so called 'obvious' characteristics of school effectiveness are not supported by research. The SER community has recently distance itself from lists of effective school characteristics because it is today acknowledged that the characteristics of educational effectiveness have a strong local character (Teddlie *et al.*, 2000a).

Lists of effective school conditions will be presented in the current study because this will help the readers of the current thesis to acquire a clearer picture of findings and theory development in the area of School Effectiveness. The lists that will be presented here are either the result of a single school effectiveness study or the result of review of many school effectiveness studies. In one such review, Purkey & Smith (1983) re-examined a number of early qualitative studies of school effectiveness. These were six evaluation studies, wherein most of the programs to be assessed were compensatory programmes, nine 'outlier' studies, all related to primary schools, and seven case studies. The most important effectiveness conditions in these studies were: (1) strong leadership, (2) an orderly climate, (3) high expectations, (4) achievement oriented policy, and (5) time on task. Other early list of effective school conditions are presented in Table 3.6 and Table 3.7 that follow.

Table 3.6. Lists with educational and school effectiveness characteristics part I (from Scheerens, 1990, cited in OECD, 1991).

Scheerens (1990)	Benveniste (1987)	Seldon (1990)
▪ Achievement stimulants	▪ Teacher time (teaching/ non-teaching)	▪ Time allocated to instruction
▪ Achievement oriented policy	▪ Course enrolment	▪ Content of instruction
▪ Educational leadership	▪ Turnover rates	▪ Indices of effective schooling
▪ Teachers co-operative planning	▪ Pupil/teacher ratios	▪ Quality of teacher preparation
▪ Quality of curriculum	▪ School day activities	▪ Characteristics of teacher workforce
▪ Evaluating potential	▪ Length of school year	▪ Quality of teaching
▪ Orderly climate	▪ Out of school learning time order and consistency	▪ Participation
▪ Time on task	▪ Truancy, absenteeism, vandalism, disruption	
▪ Structured teaching	▪ Student turnover	
▪ Opportunity to learn	▪ Student co-operative behaviour	
▪ High expectations		
▪ Monitoring progress		
▪ Reinforcement		

Table 3.7. Lists with Educational and School Effectiveness characteristics part II (from Scheerens, 1990, cited in OECD, 1991).

Windham (1988)	UNESCO (1976)	Taeuber (1987)	Oakes (1987)
▪ Instructional organisation	▪ Allocation of resources	▪ Instructional leadership	▪ Access to knowledge (e.g. Instructional time)
▪ Alternative technologies	▪ Retention and progression rates	▪ Curriculum	▪ Press for achievement (e.g. Graduation requirements)
▪ Use of teacher and student time	▪ Teacher/hours per pupil per year	▪ Types of instruction (whole class, small group, etc.)	▪ Professional conditions for teaching (e.g. Time spent on collaborative planning)
	▪ Cost and management	▪ Time on task	
		▪ School climate	
		▪ Influence of peer group	

In the 1990s, other lists of effective school characteristics have been added to the knowledge base of School Effectiveness Research. Levine & Lezotte (1990) used the 'outlier' design in order to distinguish effective from ineffective schools and presented important correlates of effectiveness. Sammons *et al.* (1995a) based their review on other review studies as well as on the findings of individual studies. They also tapped a number of important issues in school effectiveness research like the size of the school effect, the differential school effectiveness and the stability of school effectiveness findings across contexts and (national) cultures (*op. cit.*). Cotton (1995) in her research synthesis described the 'characteristics and practices identified by research associated with improvement in student performance'. The effectiveness-enhancing conditions of schooling in the studies of Levine & Lezotte (1990), Sammons et al. (1995) and Cotton (1995) are summarised in Table 3.8.

Table 3.8. Effectiveness-enhancing conditions of schooling in three review studies (from Scheerens & Bosker, 1997: 156).

Levine & Lezotte (1990)	Sammons *et al.* (1995a)	Cotton (1995)
▪ Productive climate and culture	▪ Shared vision and goals ▪ A learning environment	▪ Planning and learning goals ▪ Curriculum planning and development
▪ Focus on central learning skills	▪ Concentration on teaching and learning	▪ School-wide emphasis on learning
▪ Appropriate monitoring	▪ Monitoring progress	▪ Assessment (district, school, classroom level)
▪ Practice-oriented staff development	▪ A learning organisation	▪ Professional development
▪ Outstanding leadership	▪ Professional leadership	▪ School management and organisation ▪ Leadership and school improvement ▪ Leadership and planning
▪ Salient parent involvement	▪ Home-school partnership	▪ Parent-community involvement
▪ Effective instructional arrangements		▪ Classroom management and organisation ▪ Instruction
▪ High expectations	▪ High expectations	▪ Teacher-student interactions
	▪ Pupil rights and responsibilities	▪ District-school interactions ▪ Equity ▪ Special programs

In another recent list, Reynolds *et al.* (1996b) present the following eight factors that can be 'distilled' from two decades of School Effectiveness Research in the United Kingdom: (1) professional leadership shared vision and goals, (2) a learning environment, (3) high quality teaching and learning, (4) high expectations, (5) positive reinforcement, (6) monitoring pupil progress, (7) pupil rights and responsibilities, and (8) purposeful teaching.

3.4.2. SUMMARY OF REVIEW STUDIES

In the area of School Effectiveness, reviews of quantitative studies (meta-analyses) outnumber the original quantitative studies. The number of original and review studies is so big that even a hypothetical review of meta-analyses would not be a simple task. Such a review of other review studies has been carried out by Bosker & Scheerens (1997). The authors used special statistical techniques and conducted a 'mega-analysis', as they call it, in the area of School Effectiveness. The results of this mega-analysis will be the topic of the following paragraphs. Some methodological issues of this mega-analysis have firstly to be addressed.

Bosker & Scheerens (1997) tried first to deal with the difficulties of choosing a number of quantitative reviews for analysis. According to the authors (Bosker & Scheerens, 1997), a number of conditions should be met in order for such a mega-analysis to be valid. First, sufficiently detailed information on the individual studies was obtained. This information concerned the operational variables of effectiveness, the way in which the outcomes were measured and adjusted, the number of cases in the original meta-analyses, the reliability of measures and the type of statistical analyses that was used. In addition, Bosker & Scheerens stressed that the reviewed studies needed to have a common set of explanatory variables. Moreover, the type of 'raw' or adjusted outcomes that were used in determining the effects of each study should also be made clear. A clear choice of effect measures should also be made. The most important school and instruction characteristics relevant to effectiveness that have been confirmed by empirical research are presented by Scheerens (1992: 84). In Table 3.9 that follows Scheerens & Bosker (1997) present a table in which they illustrate the factors of schooling that matter in respect to enhancing school effectiveness. This table has been constructed with findings of: (a) qualitative reviews, (b) quantitative research syntheses, (c) empirical studies, and (d) international comparative analyses.

Table 3.9. The degree to which the most important school and instruction characteristics relevant to effectiveness have been confirmed by empirical research (from Scheerens & Bosker, 1997: 212).

Characteristics	Multiple empirical research confirmation	Reasonable empirical basis	Doubtful empirical confirmation	Hypothetical
Structured teaching	a			
Effective learning time	a			
Opportunity to learn		a		
Pressure to achieve		a		
High expectations		a		
Pedagogic leadership			a	
Assessment ability			a	
School climate			a	
Recruiting staff				a
Organisational/structural preconditions			a	
Physical/material school characteristics		b		
Descriptive context characteristics			a	
External stimuli to make schools effective				a
Parental involvement		a		

Note: *a* indicates a meaningful influence; *b* indicates a more marginal influence.

Table 3.10. Review of the evidence from qualitative reviews, international studies and research syntheses that are supported to enhance school effectiveness (from Scheerens & Bosker, 1997: 305).

	Qualitative reviews	International analyses	Research syntheses
Resourse input variables			
Pupil-teacher ratio		-0.03	0.02
Teacher training		0.00	-0.03
Teacher experience			0.04
Teachers' salaries			-0.07[a]
Expenditure per pupil			-0.20[b]
School organisation factors			
Productive climate culture	+		
Achievement pressure for basic subjects	+	0.02	0.14
Educational leadership	+	0.04	0.05
Monitoring/evaluation	+	0.00	0.15
Co-operation/consensus	+	-0.02	0.03
Parental involvement	+	0.08	0.13
Staff development	+		
High expectations	+	0.20	
Orderly climate	+	0.04	0.11
Instructional conditions:			
Opportunity to learn	+	0.15	0.09
Time on task/homework	+	0.00/-0.01 (n.s.)	0.19/0.06
Structured teaching	+	-0.01 (n.s.)	0.11 (n.s.)
Aspects of structured teaching:			
co-operative learning			0.27
feedback			0.48
reinforcement			0.58
Differentiation/adaptive instruction			0.22

Note: -Numbers refer to correlations the size of which might be interpreted as: 0.10: small; 0.30: medium; 0.50: large.
n.s.: statistically not significant.
+ a positive influence;
[a] having assumed a standard deviation of $5000 for teacher salary.
[b] assuming a standard deviation of $100 for PPE.

Heck & Marcoulides (1996) have stated that although the literature on school effectiveness has identified some essential variables, few attempts have been made to unify the conceptual components of school factors into a theory that explain outcomes. However, Scheerens & Bosker (1997), after considering the review studies and the research syntheses that were presented in Section 3.4.2, pointed to the existence of a substantial degree of international agreement of 'what works in education'. This is how the authors describe the bases of effective schooling:

Effective schooling' is seen to be a product of *vision*, supported by an *achievement-oriented policy*, production of result-oriented policy, production or result-oriented management, and which is shared by a common climate of quantity and targetness of exposure in terms of time on task and test-curriculum overlap and appropriate technology, in which close guidance, monitoring, feedback and reinforcement are key elements (Scheerens & Bosker, 1997: 207-208, emphasis in the original).

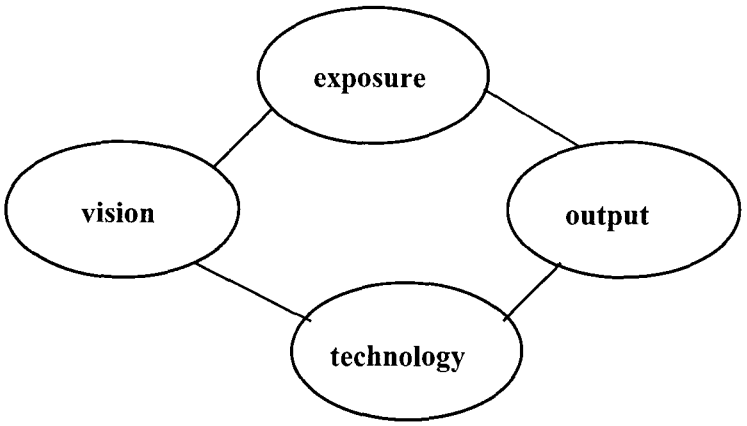


Figure 3.2. Essential ingredients of effective schooling (from Scheerens & Bosker, 1997: 208).

3.5. MODELLING SCHOOL EFFECTIVENESS

School effectiveness models are attempts to create simple conceptual maps in which the most promising variables that have come out of educational effectiveness research are more or less ordered according to an input-process-output framework (Bosker & Scheerens, 1994). When the interrelationships between various categories of variables are specified in more detail, these ordered summaries of variables could be referred to as school effectiveness models. Thus, in the literature of School Effectiveness, two categories of models could be distinguished: (a) conceptual (substantive) models of school effectiveness and (b) statistical models of school effectiveness.

The substantial school effectiveness models represent in most of the times the theoretical background of the researcher(s). According to Barr & Dreeben (1983), the common ingredient in these models is an image of the production of educational outcomes, where the school is seen as a system of nested layers. The emphasis on particular categories of variables among the models varies. Educational economists, for example, are interested in educational production functions, educational psychologists are interested mainly in instructional learning conditions, educational sociologists have a particular interest in contextual variables, the researchers that operate in the field of educational administration are mostly interested in organisation and management conditions and the school environment. In the literature of SER, the most prominent models of school effectiveness have the form of integrated multilevel educational effectiveness models, which contain a collection of important contextual, school- and class-level variables. Five such models can be found in literature of school effectiveness research:

I. The *integrated model of school effectiveness* of Scheerens (1990) which is based on a review of the instructional and school effectiveness research literature. Its main assumption is that higher level conditions facilitate lower level conditions (see Figure 3.4).

II. Stringfield & Slavin's (1992) QAIT/MACRO Model (QAIT standing for quality, appropriateness, incentive, and time and MACRO for meaningful goals, attention to academic focus, co-ordination, recruitment and training and organisation).

III. Creemers' (1994) *Model of educational effectiveness*, which stresses the consistency between the curriculum, the grouping procedures, the teacher's behaviour and the quality of instruction (see Figure 3.6). In a relatively recent paper, Reezigt *et al.* (1999) tested the main assumptions of Creemers' model of educational effectiveness by reanalysing a large-scale longitudinal data set in the Netherlands. The authors (*op. cit.*) did not suggest any changes to Creemer's (1994) model of educational effectiveness.

IV. Creemers' (1994) *model of school learning*, which is closely related to the very well known Carroll model (Carroll, 1989) with relatively more emphasis given on the classroom level, the nature of instruction and the idea that higher levels of organisational and contextual conditions facilitate lower level condition (see Figure 3.5).

V. Sammons *et al.* (1997) *integrated model of secondary school academic effectiveness*, which draws on the work of Creemers (1994) and Scheerens (1990) and the special characteristic of which is the existence of variables in departmental level (see Figure 3.3).

According to Stringfield (1994), models of school effectiveness are very useful because they can help to explain previous research parsimoniously and they can be used as 'road maps' for further theory development and practice redirection. Bosker & Scheerens (1994: 160) present the general characteristics of the most well known school effectiveness models found in the literature:

- the variables are categorised according to an input-process-outcome and context structure;
- the models incorporate a multi-level structure, usually at pupil, classroom and school-level, sometimes even extending to school-environment level;
- the models also recognise causal chains, *i.e.* intermediate causal variables that reflect the influence of certain other variables;
- in some cases the models also include non-recursive relationships (feedback loops) implying self-regulating causal mechanisms.

However, despite the above-mentioned common characteristics, Bosker & Scheerens (1994) found a great deal of uncertainty surrounding models of school effectiveness. According to the same authors (*op. cit.*), two main sources of uncertainty in the models are: (a) the lack of consistency in the research findings that corroborate the models, and

(b) the difficulties in the interpretation and formal specification of the cross-level interrelationships within the models.

The problem of the lack of consistency in the research findings that corroborate the multilevel models of School Effectiveness has been discussed by Hill & Row (1996). The authors explains why different studies generate different findings, identify some key issues in the design of the studies and give practical advice for model construction. Bosker & Scheerens (1997) also present a number of explanations for the lack of consistency in the findings. According to the authors, one possible explanation is that the organisational conditions are 'distal' compared with educational ones and, thus, it is more difficult for the researchers to establish their impact. Another possible explanation, according to the authors is that the discrepancy in the results may be the due to a phenomenon, known in economic theory as the phenomenon of 'diminishing returns'. Scheerens & Bosker (1997) claim that in most educational systems in the developed world, basic learning and teaching conditions are present and consequently an increasing amount of inputs is required to attain a smaller increment on the effect variables. Moreover, the authors indicate that school effectiveness explanatory variables are connected with relative and not with absolute achievement levels of schools.

As regards the problem of the interpretation and formal specification of the cross-level interrelationships within the models, Bosker & Scheerens (1994) and Scheerens & Bosker (1997) present five 'alternative' models of School Effectiveness. According to the authors, the relationships between conditions at higher and lower levels can take the following forms:

- the higher levels can modify the shape of so-called 'contextual effects',
- the higher levels to act as mirrors to conditions at lower levels,
- the higher levels can be thought as overt measures creating effectiveness-enhancing conditions at lower levels,
- the conditions at higher levels can serve as incentives to promote efficiency-enhancing conditions at lower levels,
- the conditions at higher levels can serve as material facilities for conditions at lower levels (a more restricted case of the second 'mirror' category),
- the higher level conditions may serve as buffer to protect efficiency-enhancing conditions at lower levels.

The same authors (*op. cit.*) have offered not only conceptual maps for the visualisation of the cross-level facilitation in the school effectiveness models but also have expressed these cross-level relationships. These hierarchical relationships are presented by Bosker & Scheerens (1994) and Scheerens & Bosker (1997) in four competing pairs of 'alternative' models. The four pairs of alternative models, according to the authors (Bosker & Scheerens, 1994; Scheerens & Bosker, 1997) are: (a) additive versus interactive models, (b) contextual versus 'genuine' multilevel effects models, (c) indirect versus causal effect models, and (d) recursive versus non-recursive models. The authors' competing pairs of alternative modes are presented in the next section.

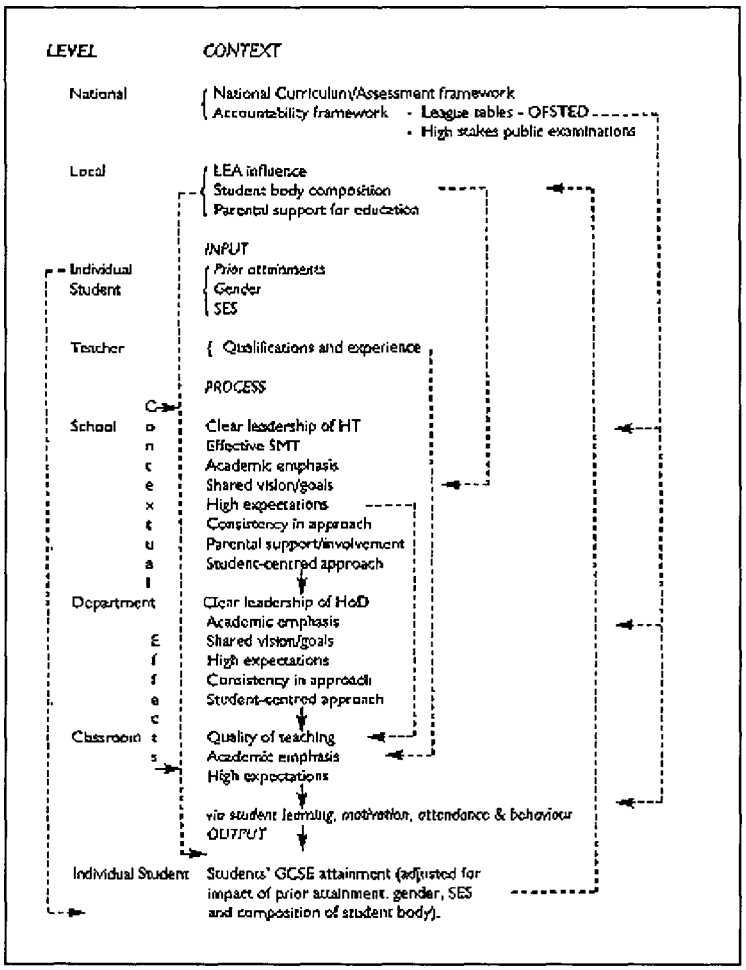


Figure 3.3. Sammons' *et al.* (1997) secondary school academic effectiveness model.

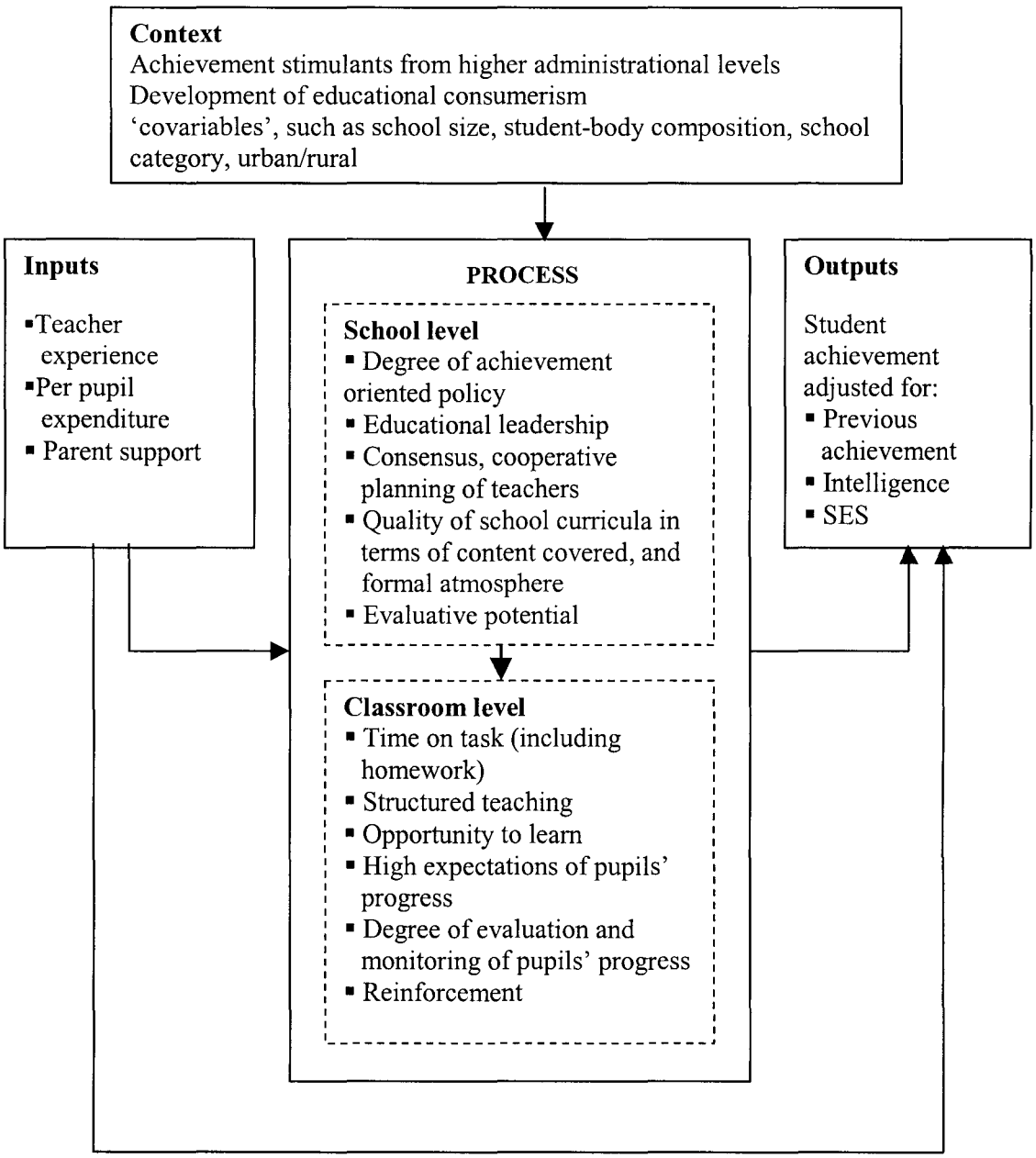


Figure 3.4. Scheerens' integrated model of school effectiveness.

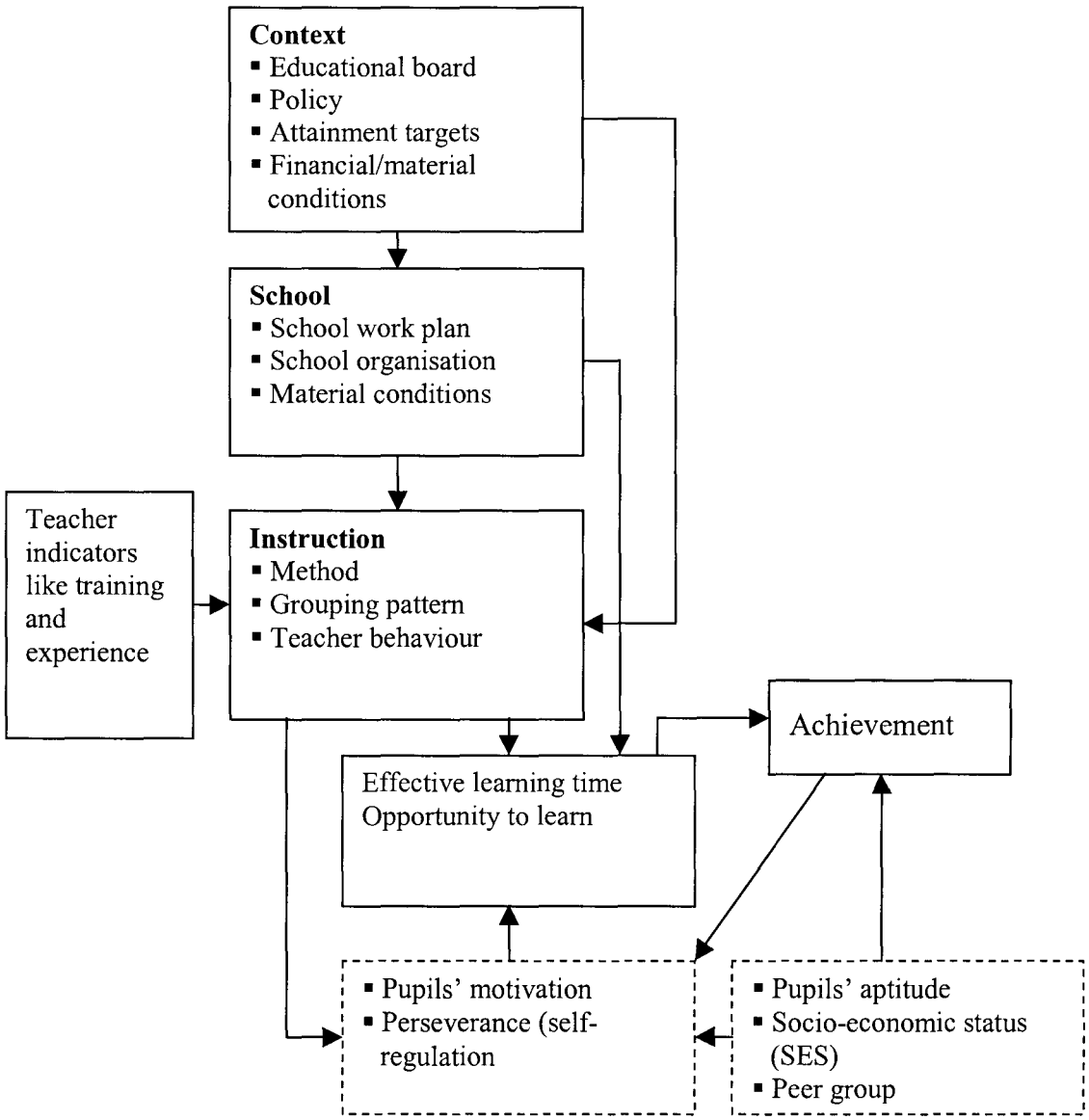


Figure 3.5. Creemers' model of school learning.

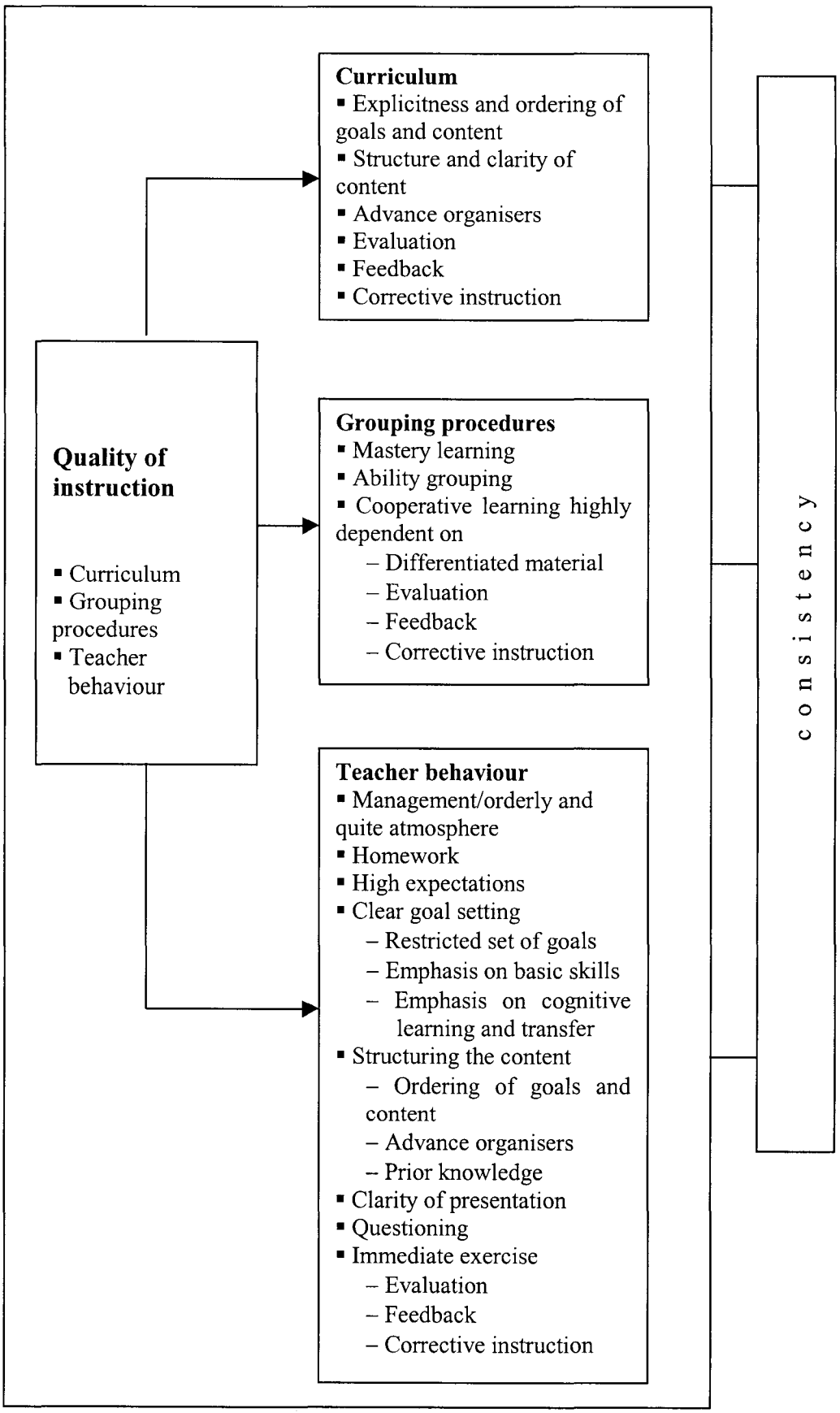


Figure 3.6. Basic model of educational effectiveness: Consistency of effective characteristics and components (from Creemers, 1994: 12).

3.5.1. ALTERNATIVE SCHOOL EFFECTIVENESS MODELS

As it was stated in the previous section, Scheerens and Bosker (1997) have designed five bipolar sets of models which describe alternative causal specifications within a global network of schools as nested layers. These models, with the statistical notation attached to them from a multilevel perspective, will be presented in the present section.

3.5.1.1. Additive versus interactive models

In the *additive* models higher level conditions are seen as increments to variables operating at the lower level, while in the *interactive* models higher level conditions impinge on the (causally interpreted) relationship between lower level antecedent conditions and the criterion variable. These two models are presented graphically by Scheerens & Bosker (1997) as follows:

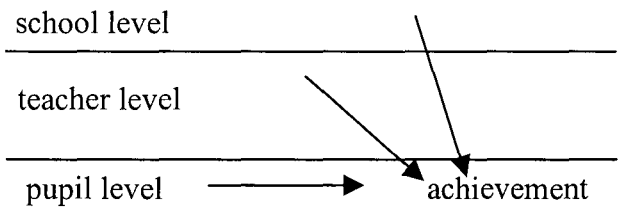


Figure 3.7. The *additive model* (from Scheerens & Bosker, 1997, p. 61).

According to the authors (*op. cit.*: 61) the additive model can be described in a three-level framework with the following equations:

$Y_{ijk}=\beta_{0jk}+\beta_1 P_{ijk}+R_{ijk}$	pupil level	1.a
$\beta_{0jk}=\gamma_{00k}+\gamma_{001} T_{jk}+ U_{0jk}$	teacher level	1.b
$\gamma_{00k}=\delta_{000}+\delta_{001} S_k+V_{00k}$	school level	1.c

The term Y_{ijk} in (1.a) represents the achievement of pupil i in class j in school k, β_{0jk} is the class-specific intercept, P_{ijk} represents the ability of pupil i in class j in school k, β_1 is the regression coefficient and R_{ijk} is the pupil level error term. In (1. b) the class-specific intercept, which can be interpreted as the mean class achievement score, transformed in such a way as to have zero mean, by subtracting the average $P...$, is modelled as a function of the school-specific intercept γ_{00k}, a teacher-level variable T_{jk};

γ_{001} is the regression coefficient and U_{0jk} is the class-level error term. Finally, in (1. c) the school-specific intercept is modelled as a function of the grand mean δ_{000}, a school-level variable S_k with accompanying regression coefficient δ_{001}; V_{00k} is the school-level residual.

The interactive model is a little more complicated than the additive one. For three levels it can be presented graphically as follows:

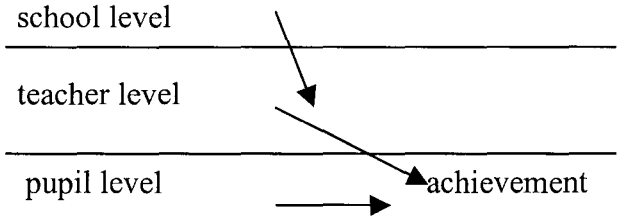


Figure 3.8. The *interaction model* (from Scheerens & Bosker, 1997, p. 62).

The equations in the interaction model are somewhat different from those in the additive one. They incorporate school-specific regression coefficients γ_{01k}. for the regression of class-mean achievement β_{0jk} on the teacher variable T_{jk} (2. b). These coefficients are then modelled in (2. d) as a function of an overall regression coefficient δ_{010}, school variable S_k with regression coefficient δ_{011} and a school level error term V_{01k}, which expresses the school-specific deviation from the overall regression of achievement on the teacher variable (Scheerens & Bosker, 1997: 61). The four equations are presented below:

$Y_{ijk}=\beta_{0jk}+\beta_1 P_{ijk}+R_{ijk}$	pupil level	(2. a)
$\beta_{0jk}=\gamma_{00k}+\gamma_{01k} T_{jk}+ U_{0jk}$	teacher level	(2. b)
$\gamma_{00k}=\delta_{000}+\delta_{001} S_k+V_{00k}$	school level	(2. c)
$\gamma_{01k}=\delta_{010}+\delta_{011} S_k+V_{01k}$	school level	(2. d)

Scheerens & Bosker (*op. cit.*) conclude that by a mere substitution the term $\delta_{011}(S_k \times T_{jk})$ can be shown to be included in the model. This term is the cross-level interaction.

It can also be easily shown that the additive model is a special case of the interactive model (where the term $\delta_{011} = 0$) and therefore more parsimonious. In model building all researchers begin with the general model and proceed to the more elaborate one. Aitkin & Zuzovsky (1994) argue that in educational effectiveness, all models should be regarded as interactive until proven not to be empirically valid. Rosenholds (1989) has

offered a theoretical analysis of the ways that school effectiveness factors may combine and interact. So far however, empirical research has provided a rather stronger support for the additive model and only a mixed support for the interactive model (see Bosker, Kreemers, & Lugthart, 1990; Gamoran, 1991).

3.5.1.2. Contextual versus 'genuine' multilevel effects

According to Scheerens & Bosker (1997), a basic challenge of the nested-layers perspective on school functioning is the thesis that school effectiveness is largely determined by selection mechanisms. Effective schools may be seen as those which attract good pupils, good teachers and good administrators. This idea can be presented graphically in the following figure, where a school level contextual variable (*i.e.* the mean IQ) has strong effects on achievement. The same idea was also expressed by Scheerens *et al.*, 2001) in their response to School Effectiveness critics (see Figure 3.1 of current work).

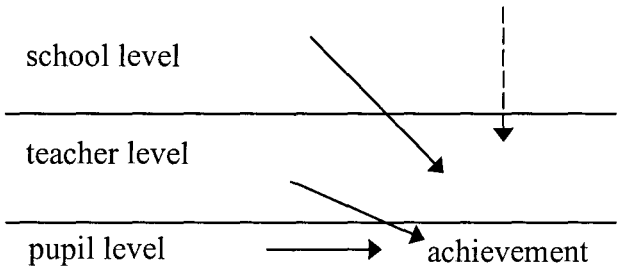


Figure 3.9. Contextual and genuine school effects (from Scheerens & Bosker, 1997, p. 63)

Statistically, the contextual versus 'genuine' multilevel effects issue can be settled by including both effects (variables) in the multilevel models and examining the relative magnitude of regression coefficients. In (3.c) below, the term $P_{..k}$ (the school average ability of pupils in school *k*) has been included in the equations (1.a) and (1.b).

$Y_{ijk}=\beta_{0jk}+\beta_1 P_{ijk}+R_{ijk}$	pupil level	(3.a)
$\beta_{0jk}=\gamma_{00k}+\gamma_{01} T_{jk}+ U_{0jk}$	teacher level	(3.b)
$\gamma_{00k}=\delta_{000}+\delta_{001} S_k+\delta_{002} P_{..k}+V_{00k}$	school level	(3.c)

According to Scheerens & Bosker (1997) the test of genuine school effects is concerned with the test that $\delta_{001} \neq 0$, not withstanding the inclusion of the effect of $P_{..k}$. The authors also stress that contextual effects are only present when $\delta_{002} \neq \beta_1$.

3.5.1.3. Indirect versus direct causal effects

According to Scheerens & Bosker (1997), conditions that are 'more than one level up' with respect to educational achievement can be seen either as direct causes of achievement or as indirectly influencing achievement via intermediate levels.

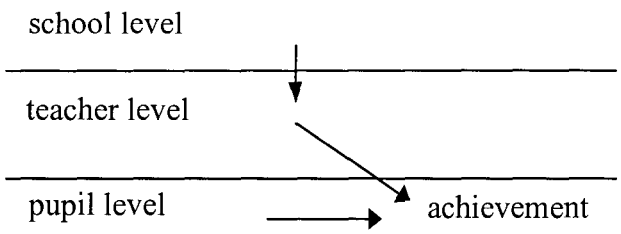


Figure 3.10. The *indirect model* (from Scheerens & Bosker, 1997, p. 64).

For the authors this sort of competing causal models however cannot simply be settled by comparing different specifications of the usual LISREL-type or path-analytic models. Instead, multilevel path-analytic techniques are required.

The use of multilevel structural equation models is a new and promising family of statistical procedures in the field of educational effectiveness. Relatively few studies have been conducted utilising such complex statistical procedures. In one of them Rowe & Hill (1997) used multilevel structural equations to track school and teachers effectiveness. In terms of statistical packages the 'Mplus' statistical package, recently developed from Bengt Muthen at UCLA, deals with multilevel structural equation analyses. However, in the absence of these models, Scheerens & Bosker (1997: 64) propose the assessing of direct and indirect effects with the use of the following equations.

$Y_{ijk}=\beta_{0jk}+\beta_1 P_{ijk}+R_{ijk}$	pupil level	(4.a)
$\beta_{0jk}=\gamma_{00k}+\gamma_{001} T_{jk}+ U_{0jk}$	teacher level	(4.b)
$\gamma_{00k}=\delta_{000}+\delta_{001} S_k+V_{00k}$	school level	(4.c)
$T_{jk}=\varepsilon_{000}+\varepsilon_{001} S_k+W_{00k}$	school level	(4.d)

In equation (4.d) the teacher variable T_{jk} serves as the criterion that is predicted from school variable S_k. As Scheerens & Bosker (1997) put it:

> An indication of the existence of indirect effects can be found by assessing that δ_{001} is zero, while it differs from zero when T_{jk} is deleted as a predictor from model (4.b). S_k should have an effect on T_{jk}, *i.e.* ε_{001} should differ significantly from zero (*op. cit.*: 64).

An example of empirical research demonstrating indirect causal effects is the work of Hill *et al.* (1995), who in their study showed that educational leadership affects teacher practices and attitudes, but has neither direct nor indirect effects on students achievement.

3.5.1.4. Additive versus synergetic interpretations

Very often in school effectiveness studies the joint effect of several effectiveness-enhancing conditions is significant while the particular variables taken individually appear to have a only a marginal effect. For Scheerens & Bosker (1997) there is a theoretical base of this situation: the configuration hypothesis of Mintzberg (1979) *i.e.* that organisations are effective only if they succeed in finding a consistent pattern of structuring. The synergetic model is supported by empirical research findings. Bosker (1990) in his PhD thesis, found that whereas no single organisational variable was linked to educational attainment, a consistent pattern of them had a significant influence on pupils' achievement. The synergetic model can be presented graphically as follows:

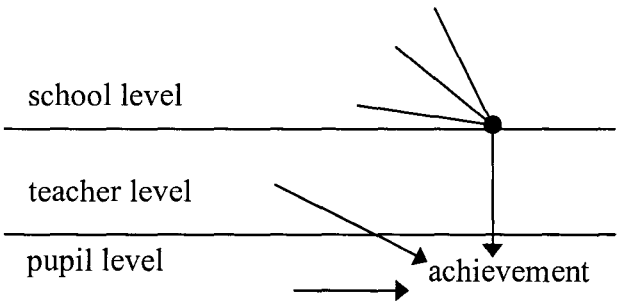


Figure 3.11. The *synergetic* model (from Scheerens & Bosker, 1997, p. 65).

According to Scheerens & Bosker (*op. cit.*) when confronted with a set of school predictor variables one might investigate the synergetic interpretation by allowing for higher order interactions in the model. However, because in a complex interactive model the number of interactions potentially of interest grows exponentially with the

number of the available predictors, the authors suggest the use of cluster analysis on the school level predictor variables. Cluster analysis is the name for a group of multivariate statistical techniques whose primary purpose is to group objects based on the characteristics they possess. Cluster analysis in other words could be used to classify the school level variables so that each variable is similar to others in the same cluster with respect to some predetermined selection criteria. The resulting clusters of variables should then exhibit high internal homogeneity and high external heterogeneity.

3.5.1.5. Recursive versus non-recursive models

The last family of multilevel models discussed by Scheerens & Bosker (1997) is the recursive, as opposed to non-recursive models. For these authors negative correlations between variables that are thought to enhance effectiveness and achievement are in fact a result of recursive relationships among essential variables of school effectiveness. The recursive model can be presented graphically as follows:

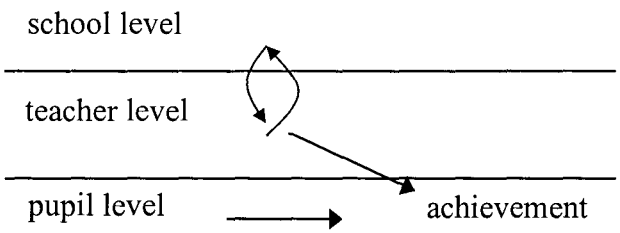


Figure 3.12. The *recursive* model (from Scheerens & Bosker, 1997, p. 66).

Scheerens & Bosker (*op. cit.*) note that empirical evidence for recursive relations in the field of school organisations is virtually non-existent, whereas the recursive interpretation seems all too plausible. The authors site the work of de Vos (1989) who presented a theoretical model with some recursive features. In de Vos' model individual achievement contributes to the mean group achievement, which in its turn affects the individual achievement and the standard set by the teacher for the class. The discrepancy between the individual achievement and the standard set by the teacher affects the learning gain to be made. The process is repeated in the next circle and so on (Scheerens & Bosker, 1997). From a theoretical point of view, there is always considerable doubt about the use of a recursive statistical model. As Berry (1984) writes:

> The decision to use a recursive model should not be taken lightly or simply for the purpose of convenience. Unless one is convicted that (1) causation among the variables is strictly unidirectional and (2) the factors constituting the error terms in the model are fundamentally different for each equation, recursive models should not be used (Berry, 1984: 15).

Scheerens & Bosker (1997) state that the question about the recursiveness or non-recursiveness of certain inter-relationships within school effectiveness models can be tackled with either experimental research, by the use of alternative path-analytic models or by the use of system-dynamic models. According to the authors, longitudinal research at school level would shed some light on the issue of whether repetitive cycles of feedback loops are important in educational effectiveness studies.

3.6. SIZE, CONSISTENCY, AND STABILITY OF SCHOOL EFFECTS

3.6.1. THE SIZE AND STRUCTURE OF THE SCHOOL EFFECT

So far in this chapter, the 'school effect' has been regarded as an unidimensional concept, large enough to be significant. In this section, however, 'school effect' will be decomposed; questions about its size, consistency and stability will be explored. The importance of the decomposition of school effect is apparent. If, for example, the size of the school effect was showed to be small, the whole theoretical basis of School Effectiveness could be proved to be 'a myth', to use a word also used by Scheerens & Bosker (1997) in *The Foundations of Educational Effectiveness*. In the *Foundations*, Scheerens & Bosker (1997) wonder if school effectiveness is an unambiguous concept and if school effects are large enough to answer questions about school effectiveness. Indeed, some critics claim nowadays that schools do not make an educationally significant difference in student outcomes and that, in reality, nothing new has been proved in terms of the first 'pessimistic' findings of Coleman and Jencks that were described in Section 3.2. Examples of this type of criticism have been made by Elliot (1996) and Thrupp (2001) and presented in Section 3.3 of the present study.

As has already been discussed in Section 3.2, early school effectiveness studies like Coleman's *Equality of Educational Opportunity* (1966), Plowden's *Children and their Primary Schools* (1967), and Jencks *et al. Inequality* (1972) showed that schools do not seem to alter overall social inequalities. More specifically, in Coleman's Report (1966), the differences between schools in mathematics achievement – adjusted for socio-economic status and schools' intake characteristics – were only 4.95% and 8.73% of the total variation for white and black students respectively. In Plowden's Report (1967) it was suggested that as much as 58% of the variance in student achievement was attributable to parental attitudinal factors. In *Inequality*, Jencks *et al.* (1972) used the difference between the experimental condition and the control group relative to the standard deviation of the criterion variable in the control group condition. The school effect was the square root of the variance accounted for by schools. After controlling for prior achievement and school intake characteristics, Jencks et al. (1972) concluded that

the school effect was 0.23 and 0.28 for white and black students respectively. In *Fifteen Thousand Hours*, Rutter *et al.* (1979) found that less than 2% of the variance in students' examination results could be attributed to a composite school process score. However, Rutter *et al.* (1979) also used the rank correlation coefficient between the composite process score and examination results and found a high value (0.76).

Studies of the second generation of school effectiveness research have been more useful for estimating the true value of the school effect as they took advantage of the algorithms and the statistical packages for multilevel analysis. One of the first studies to take advantage of these algorithms was Aitkin & Longford's (1986) reanalysis of the data from a study of secondary school public examination results. In their report, Aitkin & Longford (1986) concluded that schools account for 10% of the variation in students' achievement. This percentage however was reduced to less than 2% when adjustments for schools' intake characteristics were made. In the *Junior School Project*, Mortimore *et al.* (1988) found that the adjusted variance in student level for achievement in reading that was accountable for by the school effect was 9%. The corresponding percentages for mathematics and writing were 9% and 11% respectively. A later reanalysis of the same database, conducted by Sammons *et al.* (1993a), showed that 14% of the variance in achievement in reading and mathematics for year 5 could be attributed to school-level. In one of the first school effectiveness studies in the Netherlands, Brandsma & Knuver (1989) concluded that school level differences accounted for 12% of the variance in arithmetic achievement and 8% of the variance in Dutch Language achievement. In the *School Effect*, which was published in 1979 by Smith & Tomlinson, it was found that about 10% of the variance in students' achievement across different test items, ability groups and ethnic groups was accounted for by the school. In that study it was also found that the school effect was not unidimensional but differed with regards to ability group, ethnicity, and ability (the notion of differential effectiveness). Fitz-Gibbon (1991) in a report of her A-level Information System (ALIS) found a school effect of around 15%. The author (*op. cit.*) attributed this large percentage to the use of content-specific tests.

3.6.1.1. Meta-analysis of a number of school effectiveness studies

In order to estimate the size of school effect, Scheerens & Bosker (1997) made a meta-analysis of a number of school effectiveness studies. More specifically, the authors scanned the international literature (ERIC, School Organisation and Management Abstracts, Educational Administration Abstracts, and the Sociology of Education Abstracts) and selected a number of studies to be used as a representative sample of all published school effectiveness studies. The authors dealt with problems of publication bias and the quality of the selected studies. Only second-generation studies using multilevel analysis were selected by Scheerens & Bosker. The characteristics of the selected studies are given by the same authors in Table 3.11 that follows.

Table 3.11. The characteristics of the 168 studies analysed by Scheerens & Bosker (1997).

Measure	Cross	79	47%
	Net	15	9%
	Both	74	44%
Level	Primary	84	53%
	Secondary	74	47%
Subject	Language	81	48%
	Mathematics	72	43%
	Composite	11	7%
	Science	4	2%
Country	The Netherlands	55	33%
	United Kingdom	35	21%
	Europe-other countries	20	13%
	North America	25	15%
	Other industrialised	19	11%
	Third World countries	6	3,6%

Note: Percentages refer to the 168 studies.

The authors (*op. cit.*) used random coefficient models in a design for meta-analyses that was first proposed by Raudenbush & Bryk in 1985. Specifically, each one of the 168 studies of Table 3.11 contained a number of replications for more subject areas or for different cohorts of students. Thus the results of the replications were considered as information at level-1 and the studies were considered as level-2. The results of this two-level analysis are presented in Table 3.12.

Table 3.12. Results from the meta-analysis on gross and net school effects (from Scheerens and Bosker, 1997).

	Gross School Effect		Net School Effect	
	Effect	S. E.	Effect	S. E.
Unconditional model				
Mean gross effect	0.4780	0.0191	0.3034	0.0169
Variance across studies	0.0332	0.0056	0.0111	0.0031
Variance across replications	0.0070	0.0015	0.0063	0.0016
Conditional model				
Intercept	0.3106	0.0038	0.2885	0.0486
Primary	0.0000		0.0000	
Secondary	0.0732	0.0384	-0.0116	0.0324
Language	0.0000		0.0000	
Mathematics	0.0175	0.0196	0.0624	0.0177
Composite	0.1315	0.0481	0.1740	0.0597
Science	0.0001	0.0629	0.0820	0.0677
The Netherlands	0.0000		0.0000	
United Kingdom	-0.0389	0.0614	-0.0648	0.0391
Europe – Others	0.0855	0.0503	-0.0788	0.0665
North America	0.0829	0.0571	0.0098	0.0494
Other Industrialised	0.0023	0.0611	-0.0090	0.0537
Third World	0.2638	0.0859	0.1812	0.0790
Residual variance across studies	0.0290	0.0048	0.0078	0.0022
Residual variance across replications	0.0065	0.0013	0.0045	0.0011
Percentage of variance accounted for	11.69%		29.31%	

Note: The gross school effects are based on 153 replications with no adjustment for initial differences between students and schools. The net school effects are based on 89 replications for which adjustments for initial differences between students and schools have been made.

By studying Table 3.12 it can be seen that the mean gross school effect is 0.4780, with variance equal to 0.0332+0.0070=0.0402. The 95% prediction interval for the gross school effects thus runs from $0.4780-1.96\times\sqrt{0.0402}=0.0870$ to $0.4780+1.96\times\sqrt{0.0402}=0.8730$. Thus, the interval (0.0870, 0.8730) may be interpreted as an approximation to the population of the gross school effects. Working in a similar way, the net school effect is estimated to be 0.3034, with the 95% prediction interval in

the space (0.0449, 0.5619). In the second part of Table 3.12 the effect sizes have been regressed against some characteristics of the replications and the studies. The intercept school effect is the estimated effect size for language achievement of students in Dutch primary schools. The gross school effect sizes for the Third World countries are significantly higher than those found for the other counties. In total, 11.69% and 29.31% of the variation in gross and net effect size estimates respectively, can be accounted for by the variables in the second part of the table. Scheerens & Bosker (1997) state that the school effects in Table 3.12 may well be underestimated because measurement error in the achievement tests shows up in the models as within-school variance. Thus the authors increase the effect size for the gross and net school effect to 0.33 and 0.56 respectively. The proportion of variance in student achievement accounted for by the school attended is thus 9% for the gross school effect and 4% for the net school effect.

What are the conclusions of the meta-analysis made by Scheerens & Bosker in *The Foundations of Educational Effectiveness*? According to the authors, 'when considering the best of currently available recent empirical school effectiveness studies no conclusion can be reached other than admitting that Coleman was right with respect to the size of school effect in terms of the between school variance on value-added outcomes in basic school subjects' (*op. cit.*: 299-300). Does this mean that the school effect is to small to be discussed about? The obvious answer to this question is 'yes' but the things might be more complicated if one considered the classroom effect together with the school effect. This theme will be examined in the next section.

3.6.1.2. School effect as compared to classroom effect

More recent studies on the school effects have used three-level analyses, considering the classroom or departmental effects jointly with school-level effects. Tymms (1993), for example, reanalysed the A-Level Information System (ALIS) database and found that 7% of the variance in examination results could be attributed to school-level. However, when the variable 'school' was dropped from the analysis and students were nested within classes and departments, it was found that the proportion of variance in classroom level was from 9% to 25%. In another study, Scheerens *et al.* (1989:794) analysed students' achievement in the *Second International Mathematics Study* (SIMS) and found that for four out of nine countries for which between-class information was

available, estimates of class exceeded 40% of the total variation (see Table 3.13 that follows).

Table 3.13. Class and school level effects in nine countries, adjusted for father's occupation.

Country	Class effect (%)	School effects (%)
Canada	17	9
Finland	45	0
France	16	6
Israel	21	8
Luxembourg	29	15
New Zealand	42	0
Scotland	31	5
Sweden	45	0
United States	45	9

An interesting study in terms of the size of school effect is the *Victorian Quality School Project* in Australia by Hill & Row (1996). The authors compared the results of two-, three, and four-level analyses of the school effect. They found that in the case of two-level analysis (students nested in schools) 18% of variance in students achievement could be attributed to schools. However, when 'classroom' was entered the models, the school-level variance was only 5% of the total variance. When a fourth level, 'cohort', was entered the equations, the school effect became negligible. The researchers argued that the small amount of school effect 'does not mean that the schools do not make a difference but that they do so mainly in the level of class' (op. cit.: 26). The percent of the variance in value-added measures of literacy (English) and Mathematics achievement in the *Victorian Quality School Project* is presented in Table 3.14.

Table 3.14. Sources of variance in English and Mathematics in the *Victorian Quality School Project.*

	Class %	School %
Literacy (English)		9
– Primary	45	7
– Secondary	38	
Mathematics		
– Primary	55	4
– Secondary	53	8

The columns of see Table 3.13 and Table 3.14 show that the effect of the class is much stronger than the effect of the school. This is in fact logical because in every human activity, the largest variation is among people and not among groups of people. As we descend from the upper levels to the lower ones, the variation increases. Does this, however, mean that school effectiveness is a 'myth' and that the real difference lies with the teachers who teach in individual classes within the schools? The answer is 'not necessarily'. In Section 3.5.1 of the current thesis a number of 'alternative' school effectiveness models demonstrated how the conditions at school level can affect the work that is being conducted from individual teachers within classes and departments. In other words, the idea here is that good schools are not simply the sum of a number of good teachers. Good teachers tend to teach in good schools.

3.6.2. Consistency and stability of the school effect

Consistency and stability are two very important issues in the study of the school effect because they can shape a researcher's ideas and formulate his or her theory. Consistency is operationally defined by Scheerens & Bosker (1997) as the correlation between different rank orderings of schools in terms of the criterion used. Stability is similarly defined as the correlation between different rank ordering of schools in terms of different points in time (*op. cit.*).

Sammons (1996) points out that relatively few studies in the area of school effectiveness have investigated school differences for different outcomes. In the original *Junior School Project* in the U.K. (Mortimore *et al.*, 1988), 19 schools were reported to have positive effects on three of the four cognitive outcomes that were examined. Another 12 schools were found to have positive effects on none or only one cognitive outcome out of the sample of 47 schools for which the data on all outcomes were available (*op. cit.*). A few years later, Sammons *et al.* (1993a, b) reanalysed the data of the *Junior School Project* and found that only 4 out of 49 schools in the sample had a significantly positive effects on students' progress in both mathematics and reading ($p < 0.05$). Six of the schools had a negative effect in both cognitive areas, whereas majority of schools was found to vary in effectiveness. In two other studies that were also focused on the primary level, Hill & Rowe (1996) and Luyten (1996) used multivariate multilevel techniques in order to model the covariation of mathematics and reading scores at student and school level. 'Value added' multivariate multilevel models revealed a consistency of 0.51 in the study of Hill & Rowe and 0.59 in the study of

Luyten. The current study has also used multivariate multilevel techniques in order to model covariance at school and student level in four subjects: Mathematics, Greek Language, Science and Religion (see Section 5.4).

The meaning of the consistency of effectiveness in the secondary school is different from the meaning of consistency in the primary school. That is because in virtually all countries, different subjects are taught in secondary school by subject-specialists. In the primary school a teacher usually teaches all the subjects. Scheerens & Bosker (1997) present the results of five studies that dealt with the issue of consistency across different school outcomes. These studies are presented in Table 3.15.

Table 3.15. Consistency across subjects in secondary education (cited in Scheerens & Bosker, 1997: 90).

Study	Subjects	Country and region	Age groups	Number of schools and students	Covariates	Outcomes
Cuttance (1987)	English, Arithmetic and overall attainment	United Kingdom, Scotland	16-year-olds 17-year-olds 18-year-olds	456 schools 18,851 students	Gender and family background	Two correlations: English-overall: 0.47 Arithmetic-overall: 0.74
Willms & Raudenbush (1989)	English, arithmetic and overall attainment	United Kingdom, Scotland	16-year-olds 17-year-olds 18-year-olds (two cohorts)	Over 6,500 students	Cognitive aptitudes, family background (individual and school aggregate)	Twelve correlations with range from 0.19 to 0.73 median: 0.57
Thomas, Sammons, Mortimore, & Smees (1995b)	Overall attainment, Mathematics, English, English Literature, French, History, and Science	United Kingdom, Inner London	15 years and older (three cohorts)	94 schools 17,850 students	Cognitive aptitudes, family background (individual and school aggregate)	Twenty one correlations with range: from 0.20 to 0.72, median: 0.35
Thomas & Mortimore (1996)	Overall attainment, Mathematics and English	United Kingdom, Lancashire	15 years and older	79 schools, 8,566 students	Cognitive aptitudes, age, gender, and family background	Three correlations: English-Mathematics: 0.46 English-overall: 0.65 Mathematics-overall: 0.68
Luyten (1996)	Mathematics and Dutch language	The Netherlands, national sample	15 years old	299 schools 10,511 students	Track, achievement at age 12, and family background	0.87 (gross) 0.40 (value added)

After what has been presented so far, one could conclude that schools show a fair degree of consistency in different academic outcomes. The degree of this consistency as found in the literature is high enough so as to justifying the concept of school effectiveness.

3.6.3. STABILITY OF SCHOOL EFFECTS OVER TIME

A number of researchers have dealt with the question of how stable is the school effect over a period of time. Willms & Raudenbush (1989) in their study of 20 secondary schools in Scotland reported the stability of 'type A' and 'type B' school effects over a period of four years (from 1980 to 1984). According to the authors (*op. cit.*), type A school effect for school j is the expected performance of student i with average background characteristics in school j. Type B school effect is similar to type A with the difference that in type B corrections have also been made for the composition of the student population within a school *(op. cit.)*. The left and the right side of Figure 3.13 presents the type A and type B effects respectively. In each case, there are 20 separate regression lines. The correlation between 1980 and 1984 for type A and type B school effect is 0.87 and 0.70 respectively. This can easily be seen in Figure 3.13, where the regression lines of the type B effect are more intertwined than the regression lines of the type A effect.

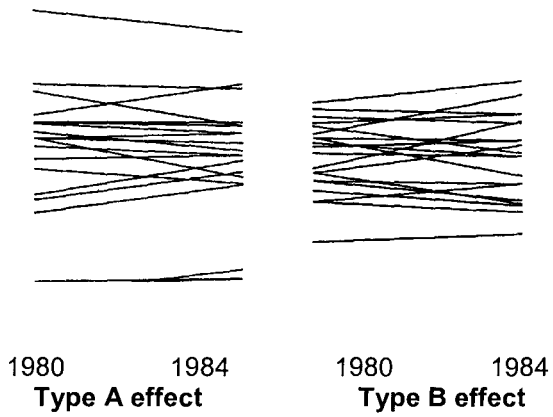


Figure 3.13. Change in school effects over time.

In another study in the United Kingdom, Gray, Jesson, Goldstein, Hedger, & Rasbash, (1995) investigated the changes in schools' performance over time in terms of total GCSE results. The researchers controlled for students' prior achievement (thus using

type A value-added school effects) and found high correlation coefficients between three consecutive years: 0.94 between 1990 and 1991, 0.96 between 1991 and 1992, and 0.81 between 1990 and 1992. Thus from what can be seen in the literature so far, school effects are relatively stable from year to year. In order to investigate the dimensions of the school effect, Scheerens & Bosker (1997: 92) present, in graphical form, the findings of a study conducted by Luyten (1994) (see Figure 3.14). Luyten (*op. cit.*) studied the examination results of five cohorts of secondary school students in the Netherlands and concluded that the total school-level variance is 15% of the total variance. The main school effect was found to amount only for 25% of the school-level variance. The most predominant factor was found to be the subject (40% of the school level variance).

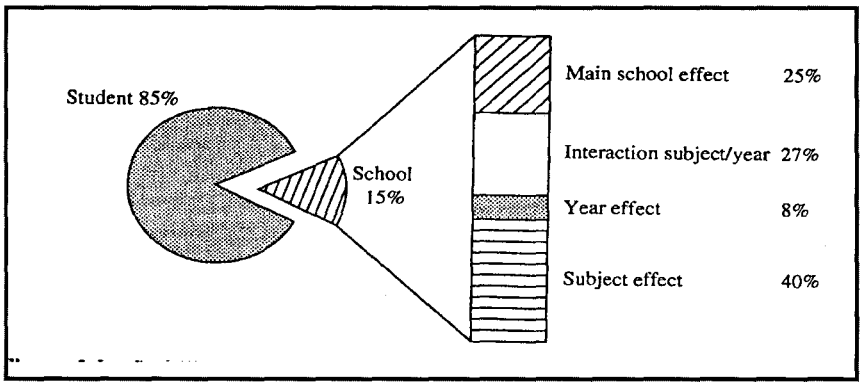


Figure 3.14. Dimensions of the school effect.

Many recent studies have also investigated whether schools are differentially effective for students with different characteristics e.g. below and above average students, different ethnic backgrounds etc. The study of the differences in school outcomes as regards students with different characteristics has been called in the literature as 'differential school effectiveness'. Today, it is generally accepted that schools matter mostly for the underprivileged and initially low-achieving students. In the *Equality of Educational Opportunity*, Coleman (1996) reported that the school effects for the black students are much higher from the corresponding effects for the white students (see Table 3.16).

Table 3.16. Effects in achievement in percentages for black and white students in the Coleman Report (from Scheerens & Bosker 1997).

	Black students		White students	
	School	Unknown Individual causes	School	Unknown Individual causes
Grade 6	20	80	14	86
Grade 9	17	83	10	90
Grade 12	21	79	8	92

In more recent study, a team of researcher investigated differential effects of schools in the United Kingdom. Sammons *et al.* (1993b) in their reanalysis of the *Junior School Project* (JSP) database found that the schools of JSP were differentially effective for students with different levels of prior attainment. More specifically, it was found that the regression lines of schools with lower initial level of student average achievement had steeper angles, an indicator that the average student in these schools had more progress than the schools with students with high initial average achievement. According to Scheerens and Bosker (1997) the general picture that emerges from the review is that schools are stable in effectiveness when the effects at the formal end of a schooling period are considered, as long as the time interval is tight. Differential effects in education regarding students' socio-economic status and other background factors (like the language spoken at home) have also been verified in PISA 2000 (see OECD, 2001).

3.7. CONDITIONS OF SCHOOL EFFECTIVENESS

The present section explores a number of conditions that have been associated with school effectiveness. Lists with effective school conditions have been presented earlier in this thesis (see Section 3.4.1). The current section however will not present findings of individual studies but instead analyses of findings of many school effectiveness studies. This is important because the effectiveness-enhancing conditions are many and in the international literature, the studies exploring these conditions may reach the thousands. The differences in the selection, definition and measurement of the effectiveness-enhancing conditions are significant among the original studies, mainly because different researchers have different theoretical orientations, different resources and level of access to the necessary data. Efforts towards the codification of the conditions which are associated with the quality of schooling have been made by scholars in the area of educational effectiveness at both organisational and instructional level. The lists which were presented in Section 3.4 have been based on other review studies and are examples of sets of factors which are considered to 'work' in education. In the fourth chapter of the *Foundations of Educational Effectiveness*, Scheerens and Bosker (1997) present the meaning of 13 factors that are considered to work in education. These factors have been reproduced here in Table 3.17. In the *International Handbook of School Effectiveness Research* (Teddlie & Reynolds, 2000), the effectiveness-enhancing conditions are presented in Chapter 4 and Chapter 5. The fourth chapter of the *Handbook* has been written by Reynolds & Teddlie (2000a) and focuses on the processes of school effectiveness. The fifth chapter of the same book has been written by Teddlie *et al.* (2000c) and focuses on context issues within school effectiveness research. Some of the effectiveness enhancing conditions are presented in Table 3.17. The meaning of some of the factors in Table 3.17 will be discussed in the following sections.

Table 3.17. Effectiveness-enhancing conditions.

Achievement orientation/high expectations/teacher expectation
Educational leadership
Consensus and cohesion among staff
Curriculum quality/opportunity to learn
School climate
Evaluative potential
Parental involvement
Classroom climate
Effective learning time (classroom management)
Structured instruction
Independent learning
Differentiation, adaptive instruction
Feedback and reinforcement

3.7.1. EFFECTIVENESS ENHANCING CONDITIONS AT ORGANISATIONAL LEVEL

The role of the current section is to present the findings of a literature review on a number of effectiveness enhancing conditions at organisational level. The conditions which are discussed in the third chapter of this thesis are those which will be explored later in the fifth chapter of the current work. The process variables which will be investigated in the fifth chapter include a collection of school organisational characteristics. Information about these characteristics will be partly selected through students' and teachers' answers to questionnaires. These organisational characteristics include teachers' work life, school environment, school climate, and school leadership.

Another process variable that will be explored in the fifth chapter of the current work is students' views of the responsiveness of the teacher, a factor which cannot be measured directly. In the current study teacher responsivenes is a statistical construct, the components of which have mainly to do with teachers' communication skills and not with the organisation of the classroom and the instruction method followed. The current study does not enter the area of instructional effectiveness (important though this area may be) and therefore findings associated with quality of teaching will not be presented

here. The rationale behind this decision reflects the insufficiency of resources for an independent PhD student to allow observation of classroom practice.

3.7.1.1. Solidarity and collegiality among teachers

An important factor in school effectiveness identified in the literature is teachers' collegiality and solidarity. Little (1982), following an 'outlier' design, conducted semi-structured interviews with 105 teachers and 14 administrators in four 'successful' and four 'unsuccessful' schools and found that in the successful schools more than in unsuccessful ones teachers valued and participated in norms of collegiality and continuous improvement. Five years later Dworkin (1987) showed that the students of teachers who show lower solidarity and work satisfaction exhibit lower achievement gains and have higher rates of absenteeism. In a more recent study Seashore & Smith (1991) also found that working conditions and career opportunities affect the degree to which teachers are actively engaged in teaching and strive to create exciting learning environments in their classrooms. The authors also list seven criteria which affect teachers' work as found in the literature. The criteria listed by Seashore & Smith (1991) are:

- *respect from relevant adults*, such as the administrators in the school and district, parents, and the community at large;
- *participation in decision making* which augments the teachers' sense of influence or control over their work setting;
- *frequent and stimulating professional interaction among peers* (e.g. collaborative work and collegial relationships) within the school;
- *structures* and *procedures* which contribute to a *high sense of efficacy* (e.g. mechanisms permitting teachers to obtain frequent and accurate feedback about their performance and the specific effects of their performance on student learning);
- opportunity to make full use of *existing skills and knowledge*, and to acquire new skills and knowledge (self-development); the opportunity to experiment; adequate resources to carry out the job; a pleasant, orderly working environment;
- a sense of *congruence between personal goals* and the *school's goals* (low level of alienation) (*op. cit.*: 37).

In another study, Rosenholtz & Simpson (1990) found that six organisational conditions, identified from a review of the socio-psychological literature on job design, affected the job commitment of 1,213 teachers from 78 elementary schools in

Tennessee. These conditions were (a) performance efficacy, (b) task autonomy and discretion, (c) learning opportunities, (d) school management of students' behaviour, (e) buffering by principals, and (f) socio-economic status of student body.

3.7.1.2. School climate and ethos

Teachers' solidarity and the collegiality is associated with what is being referred to as 'school climate', 'school ethos', 'school culture' or 'school atmosphere'. The notion of school climate has been defined differentially by various researchers and has been approached either as an outcome or as an explanatory variable. In terms of definitions, Robertson & Sammons (1997) choose to use the term 'school culture'. The authors (*op. cit.*), argue that organisational culture is concerned with deeply held beliefs and values, demonstrated in outward behaviour. For Robertson & Sammons (1997) school culture is difficult to define. According to the authors (*op. cit.*) a school may incorporate different cultures: student culture, teacher culture and non-teaching staff and parent cultures. Furthermore, there may be sub-cultures among main cultures, where, for example, the staff is split.

Robertson & Sammons (1997) have distinguished 'school culture' from 'school ethos' writing that the latter is a more outward expression of those norms, beliefs and values as rules, standards or modes of operation. The term 'school ethos' is used by British researchers more often that the term 'school culture'. Ethos has been connected in the British studies with the composite learning climate that is provided for the students of each school. In the book *Managing the Effective School* edited by Preede (1993), Torrington & Weightman have also discussed the difference between 'school ethos' and 'school culture'. For the authors the former is a 'self-conscious expression in relation to the behaviours and values in each school'. School culture on the other hand was described by the authors as a more 'managerial' issue. Anderson (1982) uses neither of these terms. Instead she uses the term 'school climate' and distinguishes four aspects of it:

- *ecology* (the physical and material environment of the school);
- *milieu* (the composition of the population of a school);
- *social system* (relationships between persons); and
- *culture* (beliefs and values of the persons in a school).

3.7.1.3. Measuring school climate

Teachers' opinions about their working conditions have in many cases been seen as a measure of the climate or ethos of a school. According to Raudenbush *et al.* (1991) a standard practice in many of the studies who look into school organisational climate is to use teachers as informants about the schools in which they participate. Thus researchers ask teachers a series of questions, and teachers' responses to interrelated items are combined to yield a scale for each teacher on one or more dimensions of organisational climate. Witcher (1993) presented a number of such research instruments for assessing school climate. Firstly, she highlighted the importance of positive school climate and the use of school climate measures as predictors of school effectiveness. The research instruments discussed by Witcher (1993) included the Organisational Climate Index (OCI), the Organisational Climate Description Questionnaire (OCDQ), the Effective School Battery (ESB), the Charles F. Kettering Ltd. School Climate Profile, and the Comprehensive Assessment of School Environment (CASE). Freiberg (1999) in a recently edited book with the title *School Climate* lists 11 climate instruments that have been used in the past for measuring school climate environment. Discrepancies in research findings on school climate and ethos are rather the rule than the exception in the literature. Hallinger & Heck (1998) believe that this discrepancy may be explained by the fact that different researchers employ different conceptual and methodological tools. A thorough presentation of the research instruments and the literature on school climate and ethos is beyond the scope of the current study. However, some important pieces of relevant work will be discussed here.

In terms of review studies Anderson (1982) based her article 'the search of school climate' on more than 200 references. In this early review the author (*op. cit.*) used organisational theory taxonomy to organise the diverse body of research and to draw conclusions about common findings. Another review study on school climate can be found in the *Handbook of Research on Educational Administration* (edited by Boyan in 1988). In the 14th chapter of this book, Miskel & Ogawa (1988) reviewed and evaluated the literature on teacher motivation, job satisfaction and school climate. The findings were summarised with the help of a number of models of 'school atmosphere'. Kallestad *et al.* (1998) explored a number of methodological and substantive issues relating to school climate. The authors used Factor Analysis (in fact, Principal Components Analysis) in order to explore the nature of school climate. Taylor & Tashakkori (1995) used a national data set in order to explore the dimensionality of

decision participation, school climate, teachers' sense of efficacy and job satisfaction. They found that the lack of obstacles to teaching and the type of leadership were the stronger school climate dimensions which could predict teachers' sense of efficacy and job satisfaction.

Heck & Marcoulides (1996) examined in the area of education the relevance of an organisational culture model that had been developed and validated by the same authors three years before (Marcoulides & Heck, 1993). Heck & Marcoulides (1996) collected data from 156 teachers which had been previously selected at random from 26 secondary schools in Singapore. The authors designed a questionnaire though which they measured 42 strategic interactions between principals and teachers, focusing on how the school is structured and governed, how it is organised instructionally, and how teachers perceive elements of its culture and climate'. The Confirmatory Factor Analysis (LISREL) resulted in a model which had a good fit with the data. Other personal and school level variables, like gender, teaching experience, academic background, and school size and type were not included in the model of Heck & Marcoulides (1996) because other variables were unrelated to organisational processes. The model and the standardised path coefficients of Heck & Marcoulides (1996) are presented in Figure 3.15 which follows. The authors (*op. cit.*), state that 'how school staff and parents are able to organise and co-ordinate the work life of the school ... shapes not only the learning experiences and achievement of the students, but also the environment in which this work is carried out' (p. 77). The school outcomes which were used as a measure of school performance in the path diagram of Figure 3.15 were the national standardised tests of Reading and Mathematics. The other factors in the model were arranged by the authors in three groups: (a) the *socio-cultural subsystem*, which includes the organisational structure and the managerial processes; (b) the *organisational value subsystem*, which included the organisational values and the organisational climate; and (c) the *individual belief system*, *i.e.* the teacher attitudes. Heck & Marcoulides (1996) interpreted their findings as supporting the notion that positive social and professional relations in the schools are related to learning.

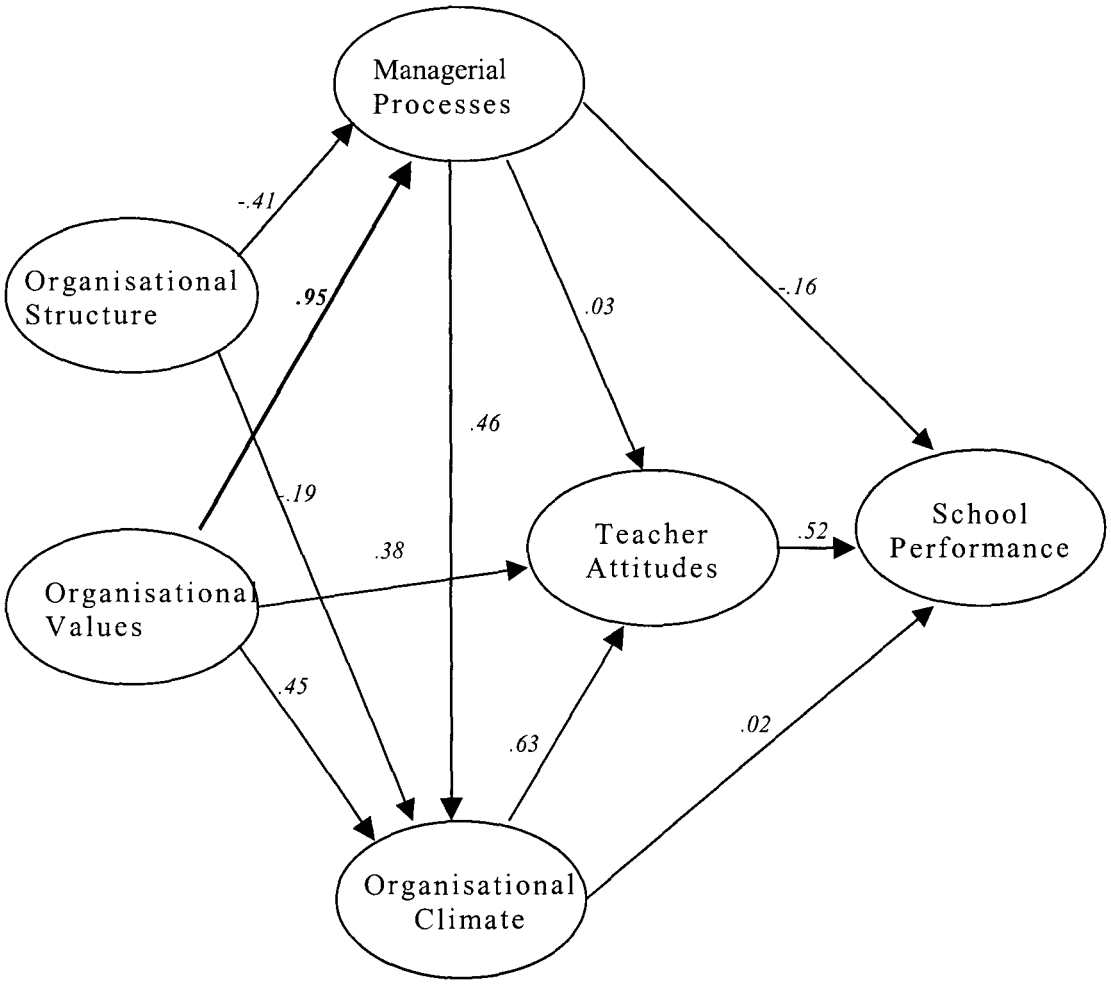


Figure 3.15. A path analytic model of organisational culture and school outcomes (from Heck & Marcoulides, 1996: 88).

In another study, Iaffaldano & Muchinsky (1985) explored the hypothesis that job satisfaction is related to job performance and found a very small correlation between these two variables. Similarly, Newmann *et al.* (1989) analysed the relationships among supportive principal behaviour, faculty collegiality, faculty trust and teachers perceptions of their school's effectiveness. The researchers found that both faculty trust in the principal and faculty trust in teachers were important links to teachers' perceptions of their schools' effectiveness (*op. cit.*). Lee *et al.* (1991) studied the organisational and the social environment of schools and found similar results to the two studies of Iaffaldano & Muchinsky (1985) and Newmann *et al.* (1989). More specifically it was found that teachers' perceived efficacy was associated with the type of leadership and communication among them. In terms of methodological tools and indexes Battistich *et al.* (1995) used hierarchical linear modelling to examine relationships between students' sense of school community, poverty level, and student

attitudes, motives, beliefs and behaviour. The authors used a diverse sample of 24 elementary schools. Within schools, individual students' sense of school community was significantly associated with almost all of the student outcome measures. Between schools, school-level community and poverty were both significantly related to many of the student outcomes (the former positively, the latter negatively).

More recent articles in the area of school climate or ethos include Hargreaves' (1995) 'school culture, school effectiveness and school improvement' and Keefe's (1994) 'school evaluation using the case-ims model and improvement process'. Keefe (*op. cit.*) presents an interactive model of the school environment in which school climate and teacher satisfaction are the mediating variables. The same author (*op. cit.*) presents the Comprehensive Assessment of School Environment model (CASE). In another recent study Tarter *et al.* (1995) used path-analytic models and concluded that it is rather the supportive behaviour of the principal and not the behaviour of the teachers which promotes trust in the principal. On the other hand, it is the collegiality between teachers and not the behaviour of the principal which fosters trust among colleagues (*op. cit.*). Other recent articles in the area of school climate include van der Sijde's (1999) article about the Dutch classroom climate. The author (*op. cit.*), in order to measure school climate, used a number of different instruments like opinion questionnaires, attitude tests and achievement tests. Finally, Seashore (1998), in a recent article explores the way in which teachers' quality of working life contributes to their commitment to work and their sense of efficacy.

3.7.1.4. School leadership

Grift & Joutveen (1999) define educational leadership as the ability of the principal to initiate school improvement, to create a learning-oriented climate, and to stimulate and supervise teachers in such a way that the latter may execute their tasks as effectively as possible. Beare *et al.* (1993) also clarify the concepts of 'leadership' and 'leader'. They present a set of definitions, according to which principals, head-teachers and other senior staff who have formal authority by virtue of their appointments are leaders and may exercise leadership. The important theme of a principal's contribution to the organisational climate of the school has been reviewed by Hallinger & Heck (1998) in the *School Effectiveness and School Improvement* journal. The authors scrutinised the literature in order to investigate the relation between principal leadership and student achievement through 1980-1995. Their main conclusion was that principals make a

significant and measurable contribution to the effectiveness of staff and learning of students but this contribution is not linear. School principals influence four components of the organisational system of the school: School aims and goals, its structure and social networks, its people, and its organisational culture.

3.7.1.5. Teachers' participation in decision making

A special dimension of working conditions in school is the extent of the teachers' influence, through participation, in school decision-making. Corcoran (1990) reviewed the literature and argued that there is some evidence of a positive relationship between teachers' degree of participation in decision making and effectiveness in schools. Corcoran stated that 'teacher participation in decisions has been shown to be related to lower levels of staff conflict, higher morale and more positive feelings about school leaders, greater commitment to new policies and programmes, more effective enforcement of discipline, and less absenteeism' (*op. cit.*: 58). Lack of opportunity for participation may increase teacher stress and burnout (*ibid.*). In terms of the association between teacher participation and school effectiveness, Brookover *et al.* (1979) found no clear, definitive relation between higher levels of teacher influence and educational outcomes. The authors stated however that 'while evidence of the benefits of increased teacher influence is fragmentary, reforms are assuming that there is a causal relationship between staff influence and school effectiveness' (*op. cit.*: 158).

Sederberg & Clark (1990) conducted a number of interviews with 'high vitality' teachers in order to find how these teachers explained their motivation. It was found that what motivated the teachers was not simply a collection of school organisational conditions. Instead, teachers attributed their motivation to replication of role models, missionary zeal and the satisfaction of reaching all students. In the same study teachers also referred to a number of organisational incentives like adequate salary, involvement in decision-making, and released time for collegial relationships. Corcoran (1990) reviewed the effective-schools literature and listed the following 10 characteristics of the work environment in which teachers are likely to be most effective:

- shared goals and high expectation of success;
- respectful and dignified treatment as professionals, by superiors, parents, and students;
- an orderly school climate in which discipline is a by-product of school organisation;
- strong and supportive instructional leadership and supervision;

- adequate and protected instructional time;
- participation by teachers in the decisions affecting their work;
- regular opportunities for collegial interaction and sharing which promote skill development and professional support;
- recognition and rewards for efforts and achievement;
- opportunities for professional growth;
- decent and safe physical working conditions (Corcoran, 1990: 150).

The same author presented the findings drawn from a qualitative study of working conditions in urban public schools, conducted by the Institute of Educational Leadership (IEL) and reported by Corcoran *et al.* (1988). The IEL data drew upon 400 in-depth interviews with teachers and administrators from 31 schools in five urban districts in the United States, providing detailed descriptions of working conditions across schools and districts. The IEL study provided insights into the effects of working conditions on the attitudes and job performance of urban teachers and the factors which account for variations in these effects across school sites. The findings of the IEL study are presented in Table 3.18.

Table 3.18. Summary of variables identified as significant problems in various studies of teacher working conditions (from Corcoran 1990: 156).

Dimension	Teachers surveys	Effective schools	IEL study
Salaries	yes	n.d.	n.d.
Class size	yes	no	yes
Workload	yes	no	yes
Preparation time	yes	n.d.	yes
Instructional resources	yes	yes	yes
Physical conditions	n.d.	yes	yes
Leadership	yes	yes	yes
Supervision	yes	yes	no
Shared goals	n.d.	yes	n.d.
Teacher influence in decisions	yes	yes	yes
Collegiality	yes	yes	yes
Teacher autonomy	no	yes	yes
Recognition and rewards	yes	yes	yes
Respectful treatment	yes	yes	yes
Professional growth	yes	yes	no
Student behaviour/attitudes	yes	yes	yes

Note: IEL is the Institute of Educational Leadership; n.d. means that no data are available.

3.7.2. School size as a factor in effectiveness

Contextual characteristics of school effectiveness are those characteristics which refer to inherited differences between schools. These differences are usually genuine school-level contrasts or 'pure' contextual characteristics like private *versus* state schools, rural *versus* urban schools and so on. In some other cases, however, contextual characteristics are aggregated data, like the mean socio-economic status of the student body, the percentage of student eligibility for free school meals, or the mean level of prior achievement. In this case, the contextual characteristics can be viewed in terms of 'compositional' effects. Teddlie *et al.* (2001) present five definitions of context concerning school effectiveness:

- the socio-economic status (SES) of students attending the school;
- The community type of the school;
- The grade phases of schooling;
- The governance structure of schools.

From a methodological point of view, both pure contextual and compositional explanatory variables can be treated as the same in the statistical analysis of educational data. Such compositional effects have been presented by the current author in Figure 3.1 (page 119). Two contextual variables will be used in the current study: school size and school type (private or state). The impact of these two variables on school effectiveness will be the theme of this section.

The findings on the relation between school size and educational outcomes are ambivalent. In two of the first studies which dealt with the association between size and outcomes is that of Barker & Gump (1964) and Conant (1967). These two studies came to opposing conclusions. In the former it is argued that small schools are superior to large ones in every aspect. In the latter it was found that size affects a school's ability to offer a wide programme of classes and in that sense larger schools were preferable. This difference is an inherited characteristic of research in school size and an indication of the complexity of such an issue. In another study Monk (1987) theorised that the curricular variation in the larger schools involves at least three dimensions in the mix of courses, and wide variation in the method of offering the courses. Haller *et al.* (1990) have stated that as schools get larger 'the comprehensiveness increases differentially both across and within subjects' (p. 116) and that the larger schools can 'add advanced and alternative courses to their curricula' (p. 117).

Fowler Jr (1995) reviewed a number of studies on the relation between school size and student outcomes. Some of the studies in Fowler's review are presented in Table 3.19. In Greece the relation between school size and students' achievement has never been investigated. School building space in Greek cities is hard to find whereas schools in rural areas are regarded as functioning at a high cost. The only reference to the size of the Greek school has been made by Kassotakis (1998) who argues that the multifarious *lyceum* (a form of *lyceum* that was abolished in 1998) had problems due to its large size. In terms of student outcomes Kassotakis referred to discipline problems in integrated multifarious *lyceia* because, as he argued, 'the high number of students that are necessary for the functioning of this specific school is not only an obstacle for the development of multifarious *lyceia* in areas with a small number of students but also is regarded by many as causing problems' in student behaviour (*op. cit.:* 116). Table 3.19 contains the findings of Fowler Jr (1995).

Table 3.19. School size and educational outcomes (review of selected studies from Fowler Jr, 1995).

Study	Outcomes	Main finding
Willems (1967)	Students to activities ratio	When the ratio is high, marginal students do not receive much attention
Lindsay (1982)	School satisfaction and sense of belonging	Satisfaction is higher in small schools
Pittman & Haughwout (1987)	Dropout rate	School size mediates the level of student participation and the severity of school problems, with larger schools producing a poorer social climate, which in turn causes a higher dropout rate
Page (1990)	Adolescent loneliness	'Students in small schools were least likely to experience loneliness' (152)
Haller (1992)	Student 'indiscipline'	'Size is significantly and substantially correlated with all measures of 'indiscipline' except for self-reported disorder' (151)
Fowler & Walberg (1991)	Retention and achievement test scores	Higher in smaller schools
Marion *et al.* (1991)	Academic achievement	School size negatively correlated with school level achievement and educational attainment, controlling for the socio-economic status of students
Baird (1969)	Non academic accomplishments (leadership, music, drama, writing, art and science)	High school size positively related to the first four academic accomplishments
Morgan & Alwin (1980)	Student participation	'Increases in school size lead to decreased student participation' (249)

Note: The parentheses in the right hand column indicate page numbers from the book *Organisational Influences on Educational Productivity*, edited by Levin *et al.* (1995).

Table 3.19. School size and educational outcomes part-2 (review of selected studies from Fowler Jr, 1995).

Study	Outcomes	Main finding
Lindsay (1984)	Extracurricular activities	'Students at smaller schools are more likely to participate in extracurricular activities' (79)
Schoggen & Schoggen (1988)	Student participation	'Students in smaller high schools on the average participate in the extracurricular activities of their schools at a higher rate than do their counterparts in larger high schools' (292)
Holland & Andre (1987)	Five areas: personal-social characteristics; academic achievement; educational aspirations and accomplishments; participants' roles in activities; and environmental social context	'Higher levels of participation brought about higher levels of student self-esteem, greater feelings of control over one's life, higher educational aspirations and attainment, improved race relations, higher grades (in males), lower delinquency rates, and more political and social involvement in young adulthood. Small schools bring about more student participation in a greater number and variety of extracurricular activities, especially for low ability and low socio-economic status students' (19-20)

Note: -The parentheses in the right hand column indicate page numbers from the book *Organisational Influences on Educational Productivity*, edited by Levin *et al.* (1995).

3.7.3. PRIVATE SCHOOLS *VERSUS* STATE SCHOOLS

It is generally thought that students in private schools achieve, on average, higher grades than their counterparts in the state schools. This hypothesis was once again verified in the recent PISA 2000 study (see OECD, 2001). The current thesis also attempts to investigate whether there are differences between state and private schools as regards student achievement in Greece. However, the most important thing is not whether there are differences between private and state schools but why these differences exist. In Section 3.3.3, the current researcher referred to Scheerens *et al.* (2001) in order to give a possible explanation for the differences between state and primary schools as regards students' achievement. The authors (*op. cit.*) assumed that private schools attract students of high socio-economic status, who usually have increased chances of success.

An investigation of the differences between private and state schools in Greece is particularly important now that a number of Greek politicians argue that all Greek schools should function as 'private' institutions in a 'market-like environment'. For example, George Psaharopoulos, a parliamentarian and professor of education economics at the University of Economics in Athens claims that the 16th article of the Greek Constitution should be changed in order that all Greek state schools may privatise (see Papagianidis & Mpaskozos, 2001). Issues like whether Greek schools should function as private institutions or whether Greek parents should be given educational vouchers are beyond the scope of the current study. For those who are interested in these issues there are a number of introductory texts like the book *School Choice and the Quasi-Market*, edited by Walford (1996), and the book *Market Approaches to Education*, edited by Cohn (1997). A number of relevant articles can also be found in the journal *Education Economics* (vol. 5, no. 3, 1997). The recent PISA study showed that expenditure per student explains 17 per cent of the variation between countries in student's mean performance (OECD, 2001: 93). However, for manageability the current study focuses on the two topics of educational effectiveness and evaluation and not on education economics. Further studies will be needed to explore the question of resources and their links with educational effectiveness in the Greek context.

3.7.4. Conclusions

In the current section, a number of school process and contextual characteristics were discussed. These process characteristics had to do with the organisational atmosphere of the school and included topics like the contribution of the head-teacher, the degree of collegiality among the staff, teachers' satisfaction and participation in decision making and other similar school climate factors. The contextual variables which were examined were school size and type. The research results regarding school size are conflicting. With regard to private or state status of the school, the literature is broad and the issue has significant political ramifications which cannot be fully discussed in the context of the present thesis.

4. DESIGNING THE FIRST SCHOOL EFFECTIVENESS STUDY IN GREECE

"I will argue that in order to describe the complex reality that constitutes educational systems we require modeling tools that involve a comparable level of complexity. I also wish to argue that, while we need continually to elaborate our models, we will almost certainly remain a long way from perfect descriptions; the journey is important, even though we may never arrive at our destination. (...) In other words we require a measure of our knowledge as well as a measure of our ignorance".

Harvey Goldstein (1998) *Models for Reality: New Approaches to the Understanding of Educational Processes*. Professorial Lecture: London Institute of Education Papers, p. 2.

4.1. SOME NOTES ON PHILOSOPHY: RECLAIMING REALITY IN EDUCATIONAL RESEARCH

The reason why the present thesis enters the realms of philosophy is that school effectiveness and educational evaluation are considered interesting fields in the philosophical domain. Specifically, School Effectiveness has been accused of subscribing to a naïve realism (see Section 3.3). Moreover, many exponents of the 'fourth generation educational evaluation' argue that all 21st century evaluators should endorse a 'constructivist' epistemology (see Section 2.4.1 and page 67). This is, for example, how Guba & Lincoln (1989) describe 'fourth generation educational evaluation':

> Evaluation outcomes are not descriptions of the 'way things really are' or 'really work', or of some 'true' state of affairs, but instead represent meaningful constructions that individual actors or groups of actors form to 'make sense' of the situations in which they find themselves. The findings are not 'facts' in some ultimate sense but are, instead, literally *created* through an interactive process that *includes* the evaluator (so much for objectivity!) as well as the many stakeholders. (...) What emerges from this process is one or more *constructions* that are the realities of the case (Guba & Lincoln, 1989: 8, italics in the original).

Goldstein (1998), in his professorial lecture at the London Institute of Education, spoke about 'models for reality'. In fact, the present study will attempt to build such models. On the other hand, however, the argument of Guba & Lincoln (1989) – *i.e.* that there is no such thing as 'reality' – is too serious to be ignored. Philosophy is not the field of the current study. However, this section will attempt to set this study's approach to research context.

In the book *Philosophy of Educational Research* Pring (2000) touches on philosophical issues like 'reality', 'objectivity', 'causal explanation', 'truth', 'facts', 'theories', and 'knowledge'. He also describes two 'paradigms' for educational research: the 'scientific' paradigm (Paradigm A) and the 'constructivist' paradigm (Paradigm B). It needs to be reminded here that according to Kuhn (1970), a 'paradigm' is a basic system of ideas and beliefs that are based on ontological, epistemological and methodological assumptions. Two definitions need also to be given. According to the *Oxford*

Companion to Philosophy, 'ontology' is a branch of metaphysics that embraces philosophical considerations about the categorical structure of reality. Finally, 'epistemology' is the branch of philosophy concerned with the nature of knowledge, its possibility, scope, and general basis (*op. cit.*). According to Pring (2000), the main characteristics of Paradigm A, are:

(a) There is a world which exists independently of me which is made up of 'objects' interacting causally with each other.
(b) There are different sciences of that world, partly depending on what is to count as an object (a 'behaviour', a 'physical object', even a 'social event').
(c) Once, however, there is an agreement on what is to count as an 'object' (e.g. behaviour), such objects can be studied, their interrelations noted, regularities discovered, causal explanations given and tested, results quantified.
(d) Other observers can check the conclusions through repeated experiments under similar conditions.
(e) Thus, from many carefully conducted observations and experiments, following critical checking from others, a scientifically based body of knowledge can be built up.
(f) That body of knowledge reflects the world as it is; the statements within it are true or false depending on their correspondence to the world as it is (Pring, 2000: 48).

The main characteristics of Paradigm B are:

(a) Each person lives in a 'world of ideas', and it is through those ideas that the world (physical and social) is constructed. There is no way that one could step outside this world of ideas to check whether or not they accurately represent a world existing independently of the ideas themselves.
(b) Communication with other people, therefore, lies in a 'negotiation' of their respective worlds of ideas whereby, often for practical reasons (they need to live and work together), they come to share the same ideas. A consensus is reached.
(c) New situations arise and new people have to be accommodated with different ideas, so that negotiation within 'a marketplace of ideas' never ceases and new consensuses have constantly to be reached.
(d) Such notions as 'truth', therefore, need to be eliminated, or redefined in terms of 'consensus', because, given (a) above, there can be no correspondence between our conceptions of, reality and that reality itself.
(e) Furthermore, the distinction between 'objective' and 'subjective' needs to be redefined since there can be nothing 'objective' in the sense of that which exists independently of the world of ideas which either privately or in consensus with others has been constructed.
(f) Development of our thinking (e.g. about educational problems and their solutions) lies in the constant negotiation of meanings

> between people who only partly share each other's ideas but who, either in order to get on practically or in order to I accommodate new ideas, create new agreements – new ways of conceiving reality. Since there is no sense in talking of reality independently of our conceiving it, therefore there are as many realities as there are conceptions of it – multiple realities (Pring, 2000: 50).

The dualism between Pring's Paradigm A and Paradigm B has been described more systematically by other authors. Guba & Lincoln (1998), for example, compared four research paradigms in terms of ontology, epistemology and methodology. The paradigms discussed by Guba & Lincoln are presented in Table 4.1. As we move from the left-hand columns of Table 4.1 to the right-hand ones, the meanings of concepts like 'reality', 'objectivity', 'fact', and 'knowledge' change. Positivism and post-positivism (columns 1 and 2) believe in an objective reality, whereas the other two paradigms do not. In addition, in columns 1 and 2 the researcher keeps a distance from the object of his or her research. Paradigms 3 and 4, on the other hand, blur the distinction between the researcher and researched object. For these two paradigms, the research findings are being created from the interaction between researchers and what is researched.

Table 4.1. Basic beliefs of alternative inquiry paradigms (from Guba & Lincoln, 1998: 203).

Item	1. Positivism	2. Post-positivism	3. Critical Theory	4. Constructivism
Ontology	Naïve realism 'real' reality but apprehendable	Critical realism-'real' reality but only imperfectly and probabilistically apprehendable	Historical realism virtual reality shaped by social, political cultural, economic, ethnic, and gender values; crystallised over time	Relativism - local and specific constructed realities
Epistemology	Dualist - objectivist; finding true	Modified dualist - objectivist; critical tradition/ community; findings probably true	Transactional - subjectivist; value-mediated findings	Transactional - subjectivistic; created findings
Methodology	Experimental/manipulative; verification of hypotheses; chiefly quantitative methods	Modified experimental - manipulative; critical multiplism; falsification of hypotheses; may include qualitative methods	Dialogic - dialectical	Hermeneutical - dialectical

The term 'realism' that can be found in the first row of Table 4.1, (the row of 'ontology'), is the view that there is a 'reality' that exists independently of the researcher. Realism can be seen in the first three columns of Table 4.1 to be described as 'naïve', 'critical', or 'historical'. In the last column of Table 4.1, however, there is no *one* reality but many. In the constructivist paradigm, 'multiple realities' exist, based on peoples' perceptions of them. Thus, for constructivists, reality is something *created* by people and, theoretically speaking, there could be as many realities as individuals.

Pring does not subscribe to Guba & Lincoln's (1998) categorisation. In the *Philosophy of Educational Research* (2000) Pring considers the very existence of human beings (persons) and makes the distinction between reality *per se* and peoples' views of reality. He argues that 'the very possibility of the social interactions, through which social reality is construed, depends upon a shared understanding (howsoever vague and general) of what it is to be a person – a centre of consciousness capable of intentional action, rational behaviour, emotional response and potential for assuming some level of responsibility' (p. 52). In other words, the very possibility of the negotiation of meanings presupposes, for Pring (2000), the existence of persons. Realism, therefore, should not be confused with naïve realism *i.e.* the view that there is a one-to-one relation between our descriptions of reality and reality itself.

In conclusion, educational researchers should reclaim reality. We must make a distinction between reality *per se* and people's views of it. It is nowadays held among social (and educational) researchers that our theories shape, determine and in some cases create what they see as proofs of theories. The *Structure of Scientific Revolutions* (Kuhn, 1970) has been very influential in the birth of this philosophical position. Because of this philosophical position, there is nowadays a widely held view among educational researchers that much quantitative educational research is ontologically 'naïve'. However, in should be noted that researchers and scholars in the area of School Effectiveness have never adopted naïve positivistic claims such as that research finding mirror reality. On the contrary, it is constantly stressed by researchers that the statistical models of reality can never be perfect, as far as educational processes are concerned. As Goldstein (1998) said in his professorial lecture at the London Institute of Education, researchers in the area of school effectiveness try to construct models which provide 'a measure of our knowledge and a measure of our ignorance'. In this study the researcher seeks to explore students' and teachers' perceptions in order to gain an understanding of

school processes in Greek secondary schools and to investigate a range of models linking such processes to measures of student outcomes.

Before ending the discussion about the philosophical ramifications of this thesis, a brief reference should be made to another line of philosophical thought which also rejects the notion of a single reality: post-modernism. The notion of post-modernism was proposed by Jean-Francois Lyotard in his book *The Postmodern Condition* (1984). Post-modernism has had great impact on educational research. Today, authors like Stronach & MacLure (1997) argue that a large part of educational research is faulty because it remains resistant to the 'post-modern embrace'. The basic idea of post-modernism is that not only reality but also Reason is a social construct. A discussion on this philosophical proposition is beyond the scope of the current study. However, a short quotation reflecting current author's opinion about post-modernism could be presented here.

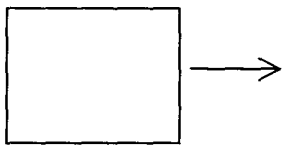
> Postmodernism's emphasis on the inscribed subject, the decentred subject constructed by language, discourses, desire and the unconscious, seems to contradict the very purpose of education which was founded on modernity's self-motivated, self-directing, rational subject, capable of exercising individual agency (Jennings & Graham, 1996: 270).

The brief quotation presented above could be seen as a starting point to further philosophical investigations.

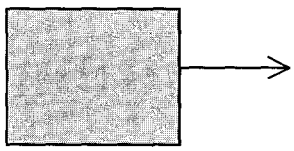
4.2. MEASURING SCHOOL EFFECTIVENESS

4.2.1. RESEARCH MODELS OF SCHOOL EFFECTIVENESS

Before presenting the research design of the current study it is necessary to present a number of models for research on school effectiveness. This will help in the categorisation and the better understanding of the variables. Shipman (1990, cited in Rae, 1997: 132) described five design models for school effectiveness research.

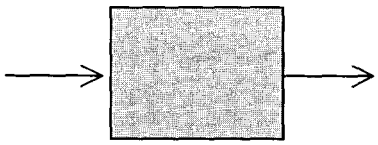


The output model.
This first model is an *ex post facto* (after-the-event) design. In using this model, there is no way of knowing what influences the outputs in a particular school.

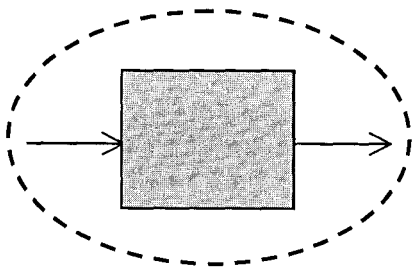


The process-output model.
In the second model, the outputs are related to different school processes. Differences among intakes and their environment could still be major influences.

The input-output model.
The third model is a before-after design. This model gives no information on what other factors may have influenced any differences in the result.



The input-process-output model.
In the fourth model the progress (output after adapting for input) of pupils can be related to aspects of school and classroom policy and practice.



The context-input-process-output model.
In the fifth model environmental factors (state, local, neighbourhood) can also be taken into account at input and output, and progress attributed to the school.

Another set of models with increasing degree of complexity for measuring the school effect, has been advocated by Scheerens & Bosker (1997). These models are:

i. the *gross school* effects model, which uses as the measure of school effect the mean (uncorrected) achievement score of pupils in a certain school;
ii. the *unpredicted student achievement* model, in which a prediction equation is estimated from student and school level data;
iii. the *learning gain* model, in which achievement is predicted from prior achievement;
iv. the *unpredicted learning gain* model, in which a post-test score is corrected for a reassessment score and then it is corrected for aptitude, socio-economic status, age, gender, ethnicity and other student and school variables.

As the research design lists develops from the output model to the context-input-output model (in the case of Shipman, 1990) or from the gross school effects model to the model of unpredicted learning gain (in the case of Scheerens & Bosker, 1997), the level of complexity and the requirement in terms of data increase. What is achieved by the use of more complex models however is a much clearer picture of the effectiveness of the schools.

The above idea has been demonstrated empirically by Sammons *et al.* (1997), in an analysis of the size of school and departmental effects in students' GCSE examination results. The authors (*op. cit.*) employed four models of varying complexity for measuring value added in schools: Model I, which did not include any explanatory variable; Model II, which included only background variables but not prior attainment; Model III; which included prior attainment measures only; and Model IV, the complete model. The percentage of total and school level variance explained by three of the above-mentioned models is presented in Table 4.2.

Table 4.2. Percentage of total and school level variance explained by three different value added models (from Sammons *et al.* 1997: 35).

Model	Total Score	English	Math.	Science
Model II total variance explained	11.6	9.5	6.9	6.0
Model II school variance explained	43.8	52.7	37.1	28.7
Model III total variance explained	40.4	36.5	33.7	36.0
Model III school variance explained	57.4	57.3	48.1	49.2
Model IV total variance explained	45.9	40.9	36.6	38.0
Model IV school variance explained	70.0	68.2	53.9	46.6

The above table shows that the reduction in school level variation between Model I (the raw model) and Model IV (the complete model) is 70% for the overall GCSE performance. In addition, the results demonstrate that Model II explains a substantially lower percentage of total variance than Model III and Model IV. On the grounds of these empirical findings, it is suggested by Sammons *et al.* (1997) that analyses that lack prior attainment data are inadequate in providing proper controls for student intake. Thomas & Mortimore (1996) came to similar conclusions by comparing five models of varying complexity for school effectiveness research in order to establish the best value added approach. In their complete model Thomas & Mortimore (*op. cit.*) controlled for a range of individual student intake factors like prior attainment, gender, age, ethnicity, mobility and entitlement to free school meals and showed that the most important factor to control for was students' prior achievement. The importance of previous achievement indices in school effectiveness research will further be discussed in Section 4.3.3.

4.2.2. CHARACTERISTICS OF A GOOD SCHOOL EFFECTIVENESS STUDY

From the above discussion, it is evident that any quantitative research design in the area of school effectiveness needs to meet a minimum set of quality standards. By referring not only to educational settings but also to other social and natural systems, Goldstein (1998) urges for 'descriptions which are at the level of complexity which is appropriate to the system being studied' (p. 15). Regarding school effectiveness research, Scheerens (1992: 66) proposes a list of six criteria for a study to be of good quality. According to the author (*op. cit.*), a sufficient school effectiveness study:

1. Taps sufficient 'natural' variance in school and instructional characteristics, so that there is a fair chance that they might be shown to explain differences in achievement between schools.
2. Uses adequate operationalisations and measures of the process and effect variables, preferably including direct observations of process variables and a mixture of quantitative and qualitative measures.
3. Adequately adjusts effect measures for intake differences between schools (e.g., In previous achievement and socio-economic status of student).
4. Has units of analysis that allow for data analyses with sufficient discriminative power.
5. Uses adequate techniques for data analysis – in many cases multilevel models will be appropriate to do justice to the fact that we usually look at classes within schools, students within classes and perhaps even schools within specific types of environments.
6. Uses longitudinal data (the more demanding condition; few studies within the school effectiveness framework are longitudinal).

In another text, Hill *et al.* (1995) described the main characteristics of 'state-of-art' studies of school effectiveness. According to the authors, good school effectiveness studies are (a) 'multi-method', in that they make use of both qualitative and quantitative techniques); (b) 'multi-level', in that they make use of sampling designs and analytic techniques that take into account the organisation of students within classes within schools; (c) 'longitudinal', in that they follow students' progress over two or more years; and (d) 'multivariate', in that they include measures or a range of student achievements, behaviours and attitudes. Hill (1998) accepts that meeting all the ideal conditions of a school effectiveness study is both time-consuming and logistically demanding. Goldstein & Spiegelhalter (1996), considering the large amount of information needed for a 'state of art' school effectiveness expressed similar ideas to those of Hill (1998) by claiming that finely graded comparisons between schools are impossible, even when considerable effort for adjustment have taken place. According to Goldstein & Spiegelhalter (*op. cit.*), the current School Effectiveness Research tradition suffers from many limitations that have to do with the size of the samples, the 'opportunistic' nature of many input and output measures, and errors in the measurement. It is on these grounds that Hill (*op. cit.*) argues that the current school effectiveness paradigm rests on a relatively 'flimsy' base.

In conclusion, it could be argued that different researchers have set similar quality standards for a school effectiveness study to be 'state of art'. These criteria can be very easy or very difficult to achieve, depending on the context in which the study is being made. The logistics of the research and the practical difficulties of conducting a school effectiveness study differ dramatically with respect to the educational system, the availability of information and the social and political context. In other words, it is practically another thing to conduct a school effectiveness study in the UK or the Netherlands and another thing to make school effectiveness study in Greece. Section 6.1.2 of the current work describes the unforeseen and insuperable difficulties of the people who worked in the Greek Pedagogical Institute, under the aegis of the Ministry of Education, in a study similar to the current one. The difficulties for an academic group or a state-supported team to conduct a school effectiveness study are considerable. Often, teams of researchers found themselves in a position between what is desirable and what is feasible. The difficulties for a single researcher to make a school effectiveness study in the context of his or her own doctorate thesis are in many cases formidable.

4.3. THE DESIGN OF THE CURRENT STUDY

4.3.1. VARIABLES, PHASES, AND RESEARCH QUESTIONS

The aim of the current study is threefold. Firstly, to identify and analyse differences between *lyceia*, secondly, to describe the structure of these differences and, thirdly, to use the findings that will be gathered in order to make an acceptable proposal for school self-evaluation. The research questions addressed are:

5. Are the *eniaia* ('integrated' or comprehensive) *lyceia* in the prefecture of Attiki equally effective in terms of their students' academic outcomes?
6. Are *eniaia lyceia* in Athens equally effective in providing their students with information about four important social issues?
7. Are *eniaia lyceia* in Attiki consistently effective for different academic outcomes?
8. If *eniaia lyceia* in Athens are not equally or consistently effective what measures and school processes may help to explain their differences?

Strongly associated with these four research question are the two following issues:

1. How could the answers to the four research questions of the study contribute to the development of a model of *lyceum* effectiveness in Greece?
2. How could a theoretical model of *lyceum* effectiveness contribute to the case of educational evaluation and school based review in Greece?

As it can be seen, the four research questions of the study are all in the area of School Effectiveness because, as Hill *et al.* (1995) would put it, they deal with the quality of schools, the extent to which schools achieve their goals and the characteristics of those schools in which students make greater progress. The two theoretical issues which follow the four research questions of the study touch the fields of educational evaluation and educational policy. In order to answer the four research questions, the current author arranged the variables of the study as in Figure 4.1. Each box in Figure 4.1 represents sets of variables in different levels, whereas the arrows represent relationships between these sets of variables. The variables and the relationships were not known from the outset but were clarified in the process of the research. A number of variables in the current study were not observed directly but were in fact statistical

constructs (Factors). The procedure for the construction of these Factors will be presented in the current chapter. The clarification and selection of the dependent and independent (or 'response' and 'explanatory') variables of this study was partly achieved by means of a pilot research that was conducted during 1998 – 1999. The main points regarding the aims and the methods of the pilot and the main study are presented in Table 4.3, below.

Table 4.3. The pilot and the main phase of the current study.

	Pilot phase	Main phase
Purpose	To test the informativity and cohesion of the questionnaires (research instruments) and provide an estimation for the intra-school correlation coefficient for the main study.	To answer the first four research questions of the present thesis.
Sample	614 student and 84 teachers in 11 integrated *lyceia*	Three different samples of students and teachers (see Table 4.7)
Research instruments	Confidential student and teacher questionnaire (I)	Confidential student and teacher questionnaire (II)
Outcomes	Affective school outcomes only	Academic and affective school outcomes
Period of data collection	February 1999	January to February 2000 (administering the questionnaires) September to December 2000 (collection of students' academic outcomes)
Statistical models used in the analysis	Latent variables models (Exploratory Factor Analysis using Principal Components and Varimax) and simple hierarchical linear models with the help of MlwiN statistical package	Latent variables models (Exploratory Factor Analysis using Generalised Least Squares and Oblimin) and complex hierarchical linear models with the help of MlwiN statistical package

As can be seen in Table 4.3 above, data collection took place in two subsequent academic years. The months that were dedicated to data collection were the first two months of each calendar year. Students' academic achievement was not available before September of 2000. The current researcher visited 11 schools for his pilot work in 1999 and 39 schools for the main work in 2000. The questionnaires were administered to the

students either by the researcher himself or by the teachers of the selected schools. In every case the researcher visited the schools himself and had had personal communication and co-operation with the teachers. In both the pilot and the main study, the questionnaires were printed – not photocopied – in pages of size A_3 (twice the size of the normal A_4 page). Each A_3 page was latter folded in the middle, thus creating a questionnaire that looked like an elegant leaflet, easy for the participants (students and teachers) to read and complete (see Appendix, p. 359). The questionnaires for the pilot work were printed in an Athenian printing office during Christmas vacations of 1998. The questionnaires or the main study were printed in the same printing office during Christmas vacations of 1999. The current researcher's personal savings covered the cost for the paper and the printers.

4.3.2. FINDINGS OF THE PILOT STUDY

The purpose of the pilot study was mainly to test the informativity and coherence of the questionnaires that were going to be used later in the main study. The 11 *lyceia* of the pilot work were found not to differ significantly in terms of a number of affective outcomes (students' perceptions). The highest intra-school correlation coefficient was for the Factor 'perceived school status' ($\rho = 0.080$). Table 4.4 presents the components of this Factor. The technique by which the components presented in the second column of Table 4.4 constructed the Factor 'school status' will be explained later in this chapter. More information about the other Factors of the pilot study can be found in the Appendix.

Table 4.4. Constructing the Factor 'school status' from the answers of the students in the pilot questionnaire.

Number of the variable in the pilot questionnaire	Description of the variable	Loading	Factor
1	Liking of school	0.502	
3	Going well with teachers	0.605	F3: SCHST
5	Teacher are fair	0.427	(school status)
6	The playground	0.359	
18	Interesting work at school	0.421	
33	Truancy	-0.433	
37	Behaving well to teachers	0.453	

Another purpose of the pilot work was to give an idea about the school-level variance and the coefficients of the statistical models. An estimation of the differences between schools, even in the affective domain, would be helpful in the prospect of the main study in 2000. With the pilot study, the current researcher gained a clearer view of the optimal number of schools and the optimal number of students per school to be selected in the main study. It was decided that the number of schools should be around 40; around 30 students should be selected from each school. The findings of the pilot study were presented in a congress at the University of Patra (Verdis, 2001b). Regarding the statistical models that were tested in the pilot work, the analysis resulted in some not statistically significant regression coefficients for all the affective outcomes. Table 4.5 presents the regression coefficients and the variance components from the Factor 'perceived school status'.

Table 4.5. Regression coefficients and variance components for the perceived status of the school.

	The 'empty' model		The 'background' model	
	Coefficient	S.E.	Coefficient	S.E.
Regression coefficients				
Intercept	-0.001	0.081	0.373	0.254
Farther large proprietor			-0.252	0.125
Mother with university degree			-0.151	0.082
Having both parents			0.058	0.117
Being a boy			-0.460	0.072
Commuting to school			-0.004	0.003
Live in a owned house			0.030	0.096
Variance components				
Variation between schools	0.054	0.030	0.040	0.023
Variation within schools	0.634	0.042	0.573	0.038
Variation between schools as a percentage of the total variation	0.080		0.065	
Goodness of fit criterion (-2 log likelihood)	1138,331		1089,068	

In both the pilot and the main study, special measures were taken in order to protect the identity of the respondents. More specifically, each questionnaire was coded with an eight-digit identification number that was made from students' own initials: the name, the surname, the father's name, and the mother's name. For example, if a student's initials were the Greek letters 'A', 'B', 'K', and 'Ω', his or her identification number would be '01021024' ('01' for 'alpha', '02' for 'beta', '10' for kappa, and '24' for omega). Thus, the current author was able to combine the data files that were created at different periods and at the same time to protect students' personal data.

In both the pilot and the main study the data, once selected, were transferred from the questionnaires to electronic databases by the author himself. A simple DOS-based program[1] named 'Dbase III plus' was used for that purpose. The data were later transferred to the other databases (Microsoft's Excell). The final database contained data derived both from the questionnaires and the Ministry of Education. Large amounts

[1] DOS stands for 'Disc Operating System', an outdated computer operating system that was developed by *Microsoft* in the 1980s.

of descriptive statistics were produced with the help of the Statistical Package for Social Sciences (SPSS). The same package was later used for the construction of the factor analytic models. Finally, the multilevel analyses of the data were conducted in the computers of the London Institute of Education with the help of the MlwiN statistical package. Figure 4.1, below, presents the variables that were used in the main study. The variables have been arranged in six different sets. The meaning of each set will be presented in the following paragraphs.

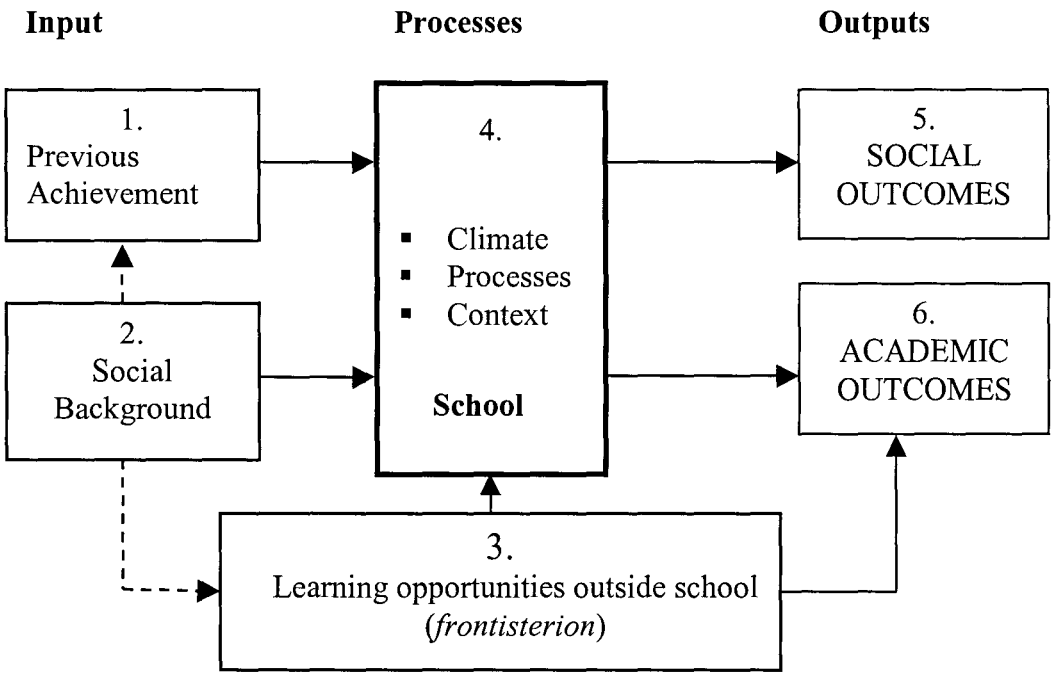


Figure 4.1. Sets of explanatory and response variables in the current thesis.

4.3.3. STUDENTS' PREVIOUS ACHIEVEMENT AND SOCIAL BACKGROUND

Boxes 1 and 2 in Figure 4.1 represent sets of independent or explanatory variables in the study. These variables were chosen to function as adjustments for differences in the intake between schools. The importance of adjustments for school intake is stated by Scheerens' (1992) in his list for an 'adequate' school effectiveness study (see page 179 of the current work). Of all the adjustments for intake, the most important is students' previous achievement. Willms (1992: 58) warns that 'if the analysis in a school

effectiveness study does not include measures of prior performance, the estimate of school effects will probably be biased'. Teddlie *et al.* (2000b) give guidelines for the most appropriate time point for prior attainment to be measured: 'ideally – they argue – such measures should be collected at the point of entry to school at the beginning of a relevant phase' (p. 95).

In the current work, one set of models which explained students' academic outcomes controlled for prior achievement. However, it must be noted that the measures of prior achievement which were used suffered from severe limitations. This is because tests and valid examinations which could possibly provide previous achievement indices are non-existent in the Greek educational system until the final two years of the integrated *lyceum*. Using the examination results at the end of the second year of *lyceum* as previous achievement indices was something which had to be decided after balancing the advantages and disadvantages of such a methodological step. Indeed it was shown that students' mean grade at the end of the second year was a very good predictor for students' achievement at the end of year 3 in every academic outcome. In simple Ordinary Least Squares regression models the variable 'mean grade in year 2' explained around 70 per cent of the variance in achievement in year 3. However, when mean achievement in year 2 was regressed against students' background and process variables, it was found that the variables which 'explained' achievement in year 3 also explained achievement in year 2. In other words, academic achievement in the final two years of *lyceum* cannot be completely separated because achievement in these two years is likely to be understood as the result of the same school effect. When the aim of a study is the measurement of the school effect, two measurement over one year period may partial out the effect of schooling, as Preece (1989) has argued. Achievement in the second year of *lyceum* would be best used by the current researcher as a controlling variable in the case where the focus was on teacher effectiveness or the 'year effect'. This however was not the focus of this thesis and would have been unacceptable to many teachers in the Greek context.

Apart from this serious disadvantage, however, there were other – non statistical – reasons for not including achievement in year 2 in the analysis. National examinations in year 2 were conducted for the first time at the end of academic year 1998-1999 (June 1999). However, during academic year 1998 – 1999 a number of factors severely distorted the normal flow of teaching and learning in Greek schools. Examinations in 1999 may have been procedurally valid but the distortion in teaching and learning

during 1998 –1999 was such that the Minister of Education gave 'optional' status to the grades which were achieved in that examination. Specifically, the mean achievement in year 2 was left out from the Equation 2.1, unless the mean achievement in year 2 was higher than the mean achievement in year 3 (see Equation 2.1 in page 62 for the formula of the calculation of the final grade in the certificate of integrated *lyceum*). In this way, the Minister of Education tried to protect the students who did not do well in year 2, due to factors beyond their control.

The lack of previous achievement indices in the current study was partially compensated by the use of information on student social background. In the questionnaires, students were asked a number of questions that investigated their socio-economic status. Such questions dealt with the size and the structure of the family, the size and type of the house, parents occupation and educational level, whether there was access to a computer at home, etc. One problem that emerged in measuring student social background was that the National Statistical Service of Greece (NSSG) could not provide information on social stratification in Greece. This was mainly for three reasons. Firstly, the NSSG does not publish such statistics either in Greek or in any other language; it only sends information on social stratification to other international and European statistical agencies. Secondly, the categories on social stratification used by the NSSG have not been reviewed since the late 1950s. However, from that decade onwards a sea change has taken place in social stratification and people's professions. Thirdly, a large but still unknown amount of economic activity in Greece takes place 'under the surface' and therefore a large percentage of the Greek workforce is still unregistered in the social security system.

Because of the situation that was described in the previous paragraph, students' outcomes could not be controlled for family earnings. In order to address the problem of social stratification, the current researcher designed a number of cards with sets of professions and another set of cards with educational degrees. The cards were printed in the student questionnaire in white and dark grey. The students were initially asked to chose which card best represented the occupation and educational level of their parents and then to describe their parents' occupation and educational level in their own words. The basis for the construction of the cards was sought in the literature of a country with economic indices similar to Greek ones. That country was Ireland. Breen & Whelan (1996) occupational stratification table in the book *Social Mobility and Social Class in*

Ireland (p. 21) was used as a basis for the construction of the occupational cards in the student questionnaire. All the cards were tested in the pilot study.

4.3.4. ONE POPULATION – FOUR SAMPLES

The population of schools in the current study are *lyceia* in the prefecture of Attiki. The prefecture of Attiki is the geographic area of the Greek capital city and includes two major cities: Athens and Piraeus. The former is the capital of Greece and the latter is the capital's port for the Saronic Gulf (Aegean Sea). These two cities with their suburbs constitute what is known in Greece as '*periohi protevousis*' (the 'area of the Greek capital city') or most commonly '*lekanopedio Attikis*' (the 'basin of Attiki'). Outside the boundaries of the basin of Attiki – but *in* the boundaries of Attiki prefecture – the population density is significantly lower and a number of smaller satellite cities exist. Small towns and picturesque villages also exist in the four islands of the Saronic Gulf: Aegina, Poros, Hydra, and Spetses. From an administrational point of view, these four islands are part of the prefecture of Attiki. According to the Data Processing Department of the Greek Ministry of Education, there are 375 integrated *lyceia* in the prefecture of Attiki. In the rows of Table 4.6 these 375 schools have been categorised according to their relation with the state.

Information on other important school characteristics, apart from school type is not available. This is because the database of the Data Processing Department of the Ministry of Education only contains information at student level (*i.e.* examination results for entering the tertiary level). Other databases, like for example, the database of the Greek Pedagogical Institute, the database of the Centre for Educational Research, and the database of the National Statistical Service of Greece were not commensurable with the database of the Ministry of Education. Therefore, no further information was available from official sources regarding the target population of schools. This unfortunate situation is part of the problem that the current study tries to solve. As noted in Chapter 2, OECD inspectors have highlighted the problem of lack of educational statistics in Greece. As they have stressed, 'this state of affairs [the lack of reliable statistics] represents a serious handicap to educational policy making' (OECD, 1997: 164). A number of contextual variables were later constructed by the current researcher from information at student level.

Table 4.6. The population of integrated *lyceia* in Attiki and the population of the students who participated in the leaving examinations of the year 2000.

Type of school	Schools		Students	
	count	per cent	count	per cent
State (public) integrated *lyceia*	307	81.7	26,434	86.5
Private integrated *lyceia*	42	11.2	2,493	8.2
Foreign private integrated *lyceia*	24	6.4	1,616	5.3
Religious private integrated *lyceia*	2	0.5	30	0.0
Total	375	100	30,573	100

Note: The Ministry of Education makes sure that teachers in the private integrated *lyceia* use exactly the same textbooks with those in the state integrated *lyceia*. The Ministry has also set rules for the hiring and the working conditions of the teachers in the private sector.

As was presented in the two previous paragraphs, basic information regarding the population of the schools in Attiki prefecture was collected from the Data Processing Department of the Greek Ministry of Education. However, because the information that is compiled in the Ministry is exclusively used for students' certification and selection, the current author designed his own data collection strategy in order to answer the questions of the study. According to the research design, 39 schools were selected from the basin of Attiki with stratified random sampling. The number of students of these 39 schools who participated in the examinations of the year 2000 was 3,380. This was 'Sample A' – the main sample of the study. In order to examine whether Sample A is adequate, a review of the literature on sampling theory in settings with a multilevel structure has been carried out.

The theory of sampling and sampling techniques is an important element in the statistical theory and it can be found in many statistical texts, simple or advanced (for example see Kental & Stuart, 1977). However, the sampling techniques have to be reconsidered in the case where the data have a multilevel structure. When, for example, the research requirements and logistics call for a sample of students in a sample of schools, the prime question is about the optimal number of students and the optimal number of schools in the sample.

The issues of sample size and statistical power in two-level analysis have been discussed by Snijders & Bosker (1993). The authors (*op. cit.*) have argued that the researcher should make a reasonable guess of the estimators of the fixed regression

coefficients (the variables at the lower and the higher level) and thus make a choice of sample sizes at either level. Another author (Mok, 1995) considered a wider range of estimators like coefficients, variances and covariances. According to her, for a given sample size, research designs that use more schools and fewer students per school are generally less biased and more efficient than other studies with fewer schools and more students per school. Practical guidelines are also very useful for the researchers who design their own multilevel study. Such guidelines are given by Afshartous (1995), who claimed that for the estimation of the regression coefficients, the number of schools should be at least 40. The same author has also argued (*op. cit.*) that in the case where the focus of the study is not on the regression coefficients but on the estimation of the variance components, the minimum number of schools in the sample should be 320. From that point of view, the samples that were used in the current study are adequate. Finally, for Cohen (1998), traditional sample designs are sufficient for estimating regression coefficients in hierarchical linear models. The author has also stated (*op. cit.*) that in the cases where it is important to estimate also the variance components, more students per school and fewer schools are needed.

In the current study, financial and practical constraints made it impossible for the researcher to collect background information from all the 3,380 students of Sample A. Therefore, with the help of random numbers the researcher chose about 30 student from each of the 39 schools of Sample A. The 1,224 selected students constituted Sample B. The students of Sample B provided information about their background and answered to questions asking for their opinion. However, the imperfect conditions for data collection in some of the schools (e.g. teachers' interference) made the researcher to exclude the opinions of the students in six of the 39 schools of Sample A. Thus the remaining 997 students who studied in 33 schools constituted Sample C. Finally, 223 teachers who taught in the 38 schools of Sample A were asked about the organisational climate of their school via a teacher questionnaire (due to circumstantial reasons, the teachers in the 39th school did not complete the questionnaires). These teachers constituted Sample D. Teachers of Sample D were purposely selected by the current researcher with the help of a number of quality criteria. According to these criteria, teachers had (a) to teach in the third grade, (b) not to regard themselves part of the unofficial administration team of the schools, and (c) be neither new to the profession, nor near their retirement. A more accurate sampling framework for the selection of teachers could not be constructed. The schools in Greece are small and teachers know each other very well.

This feature affected both the procedures for the selection of the teachers and the content of the questions in the teacher questionnaire. The samples of the current study are presented in Table 4.7. Figure 4.2 is a simple map of Greece with the prefecture of Attiki in grey. According to information that was provided by the Ministry of Education (personal communication), 42% of the students who participated in the examinations of June 2000 studied in the prefecture of Attiki.

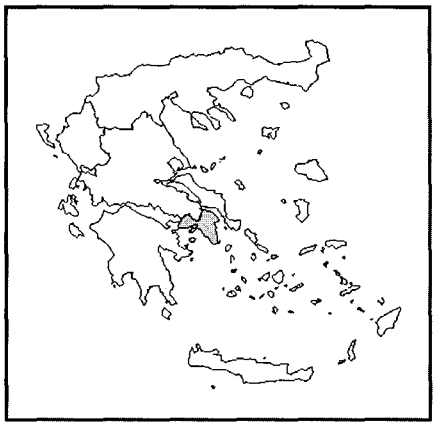


Figure 4.2. Map of Greece with the prefecture of Attiki in grey.

Table 4.7. The population and the four samples of the study.

Name	Level-one	Level-two	Collected information
Population	375 integrated *lyceia* in the prefecture of Attiki	All the 30,573 students of the 375 *lyceia* in the prefecture of Attiki	Academic outcomes, a measure of prior achievement, basic contextual characteristics at school level, and basic student background information (gender, year of birth, and programme of studies)
Sample A	39 state integrated *lyceia* in Athens	All the 3,382 students of the 39 schools	All the above plus information on school processes derived from Sample D
Sample B	The same as Sample A	A random sample of 1,225 students (subset of Sample A)	All the above plus more detailed information on students' backgrounds (like socio-economic status)
Sample C	33 *lyceia* (a subset of Sample A)	A random sample of 997 students (subset of Sample A)	All the above plus social outcomes, affective outcomes and more school processes derived from student questionnaires (five Factors)
Sample D	38 *lyceia* from the 39 of Sample A	A purposive sample of 223 teachers	School organisational climate and school processes that derived from a teacher questionnaire (four Factors)

Before proceeding to the analysis, the current researcher had to make sure that the students in Sample A and the subsequent Samples B, C, and D are representative of the population of students. This will be discussed in the remaining part of Section 4.3.4. However, with regards to the organisational characteristics of the schools, Samples A, B, C, and D do not represent the integrated *lyceia* in the prefecture of Attiki. This is because only state schools were included in Sample A. Some organisational characteristics of the schools in Attiki (e.g. their size and type) became known after the study. An the beginning of the study, the Greek Ministry of Education could only provide a simple catalogue for state schools in the prefecture of Attiki. In this catalogue no information was available for private schools. Thus, all the schools of Sample A are state integrated *lyceia* in the 'so-called basin of Attiki' (the greater area of Athens, Piraeus, and their suburbs). Consequently, it is right to state that inferences based on Sample A cannot be made for private schools and schools outside the basin of Attiki. However, student-level information is available for all schools in the population and

therefore conclusions for private schools can be made from the analysis of the student-level data.

As regards the samples' characteristics in level-one, it was found that Samples A, B, and C did not differ significantly from the population in the areas of (a) boys to girls ratio, (b) the percentages of participation in the programmes of studies, (c) year of birth, and (c) student achievement in nine subjects. The four following tables show the characteristics of the three samples in comparison with the characteristics of the population. Small discrepancies in the total number of students between the tables are due to missing values. In Table 4.8 that follows, the population and the three samples are compared in terms of student gender.

Table 4.8. Boys and girls in the population and the three samples.

Sex	Population		Sample A		Sample B		Sample C	
	count	perc.	count	perc.	count	perc.	count	perc.
Boys	14,069	*46.02*	1,879	*55.6*	697	*56.9*	557	*57.0*
Girls	16,504	*53.98*	1,503	*44.4*	527	*43.1*	420	*43.0*
Total	30,573		3,382		1,224		977	

In Table 4.9, the population and three samples are compared in terms of programme of studies. The discrepancies among the samples are not significant.

Table 4.9. The percentages of students in the three programmes of studies.

Programme of Studies	Population		Sample A		Sample B		Sample C	
	count	perc.	count	perc.	count	perc.	count	perc.
Humanities	11,676	*38.19*	1,333	*39.4*	498	*40.7*	388	*39.8*
Sciences	9,760	*31.92*	987	*29.2*	351	*28.7*	277	*28.4*
Technology	9,137	*29.89*	1,060	*31.4*	374	*30.6*	311	*31.9*
Total	30,573		3,380		1,224		976	

Table 4.10 shows that the students in the three samples do not differ significantly from the students of the population as regards their year of birth.

Table 4.10. Students' year of birth in the three samples and the population.

Year of birth	Population		Sample A		Sample B		Sample C	
	count	perc.	count	perc.	count	perc.	count	perc.
Before 1982	1,349	*4.43*	136	*4.0*	37	*3.1*	31	*3.2*
In 1982	22,755	*74.66*	2,529	*74.8*	906	*75.6*	734	*75.1*
After 1982	6,375	*20.92*	709	*21.0*	255	*21.3*	211	*21.6*
Total	30,479		3,374		1,198		976	

Finally, in Table 4.11 it is demonstrated that population means and standard deviations of seven common subjects did not differ significantly from the corresponding statistics in the three samples.

Table 4.11. The means and the standard deviations of seven subjects for the population and the three samples.

Subject	Population		Sample A		Sample B		Sample C	
	mean	s.d.	mean	s.d.	mean	s.d.	mean	s.d.
Orthodox Religion	16.5	*2.5*	16.6	*2.4*	16.6	*2.3*	16.6	*2.3*
Greek Language	13.8	*2.5*	13.8	*2.5*	13.8	*2.4*	13.8	*2.4*
History	14.2	*3.7*	14.3	*3.7*	14.2	*3.6*	14.2	*3.6*
Science	15.4	*3.6*	15.5	*3.6*	15.5	*3.5*	15.5	*3.4*
Biology	16.3	*2.8*	16.4	*2.8*	16.3	*2.8*	16.4	*2.7*
Epistemology	16.8	*2.7*	17.0	*2.6*	16.9	*2.6*	17.0	*2.6*
Mathematics	14.5	*4.1*	14.4	*4.2*	14.3	*4.1*	14.4	*4.1*
Mean in Year 2	13.4	*2.8*	13.5	*2.7*	13.4	*2.8*	13.4	*2.8*
Mean in Year 3	14.8	*2.9*	14.8	*2.9*	14.8	*2.8*	14.8	*2.8*

4.3.5. THE INTERPRETATION OF ACADEMIC OUTCOMES

The decision on the most appropriate academic outcomes is a crucially important element of every school effectiveness study. As Hill (1996) has argued, the choice of outcome measures has major implications for the conclusions that one might draw regarding the impact of student-, class- and school-level effects. A basic distinction between two possible types of academic school outcomes in school effectiveness studies has been made by Scheerens & Bosker (1997). The authors (*op. cit.*) distinquish between measures of academic achievement and measures of academic attainment. As they write:

> Attainment measures are close to the economic notion of effectiveness as maximisation of outputs, where output is measured as the amount of product resulting from a particular production process. (...) Achievement, in contrast, fits more neatly into an interpretation of effectiveness in terms of 'quality'. Achievement tests as effectiveness criteria capitalise on more fine-grained quality differences of the units of outputs (Scheerens & Bosker, 1997: 51).

The current study uses both measures: achievement and attainment. The former is students' normalised grades in the nationally examined subjects presented in Table 2.13 (p. 26). The latter is students' success in the certificate of integrated *lyceum*. Two issues must be discussed here in relation to students' academic achievement: (a) the degree to which the measures of academic achievement are close to what is being taught in the classrooms and (b) the degree to which academic achievement plays an important role to the life of the students (is of 'high stakes' for them). Both issues that were described above, affect the nature of a school effectiveness study.

The degree to which the measures of academic achievement are close to what is being taught in the classrooms has been discussed by Scheerens & Bosker (1997). The authors present a list with possible measures of academic achievement for investigating educational effectiveness. Scheerens & Bosker (1997) discern the following outcome measures:

- authentic assessment by trained teachers,
- trained test items,
- content specific measures,
- Rasch scales of narrow content areas,
- subject-specific tests,

- general scholastic aptitude tests,
- intelligence tests.

The authors (*op. cit.*) do not show any preference to any of the measures that are presented above but state that the list should be seen as a 'continuum with many discrete scale points rather than a dichotomous choice between two extremes' (p. 53). In the current study, student results in curriculum specific tests at the end of integrated *lyceum* were used as measures of academic achievement. This was the only possible solution as no other reliable measures of academic achievement (with the exception of the results of the PISA 2000 study) have ever existed in Greece. In the literature of school effectiveness research, most researchers have used general tests of academic achievement. However, in a number of British and Scottish studies subject-specific examination results (GCSEs and standard grade scores) have been used as measures of academic achievement (Sammons *et al.*, 1996; Thomas *et al.*, 1995a; Thomas *et al.*, 1995b; Thomas *et al.*, 1997a; Tymms, 1993). From a theoretical point of view, Madaus *et al.* (1979) maintain that curriculum-specific tests are most appropriate when the aim of the study is the maximisation of the school- or classroom-effect.

As regards the issue of using students' examination results for measuring the quality of the educational system, Kellaghan (1996) asks whether public examinations can be used to provide information for national assessment. According to the same author (*op. cit.*), the answer is negative. As he writes (*op. cit.*: 46), 'I think that the clear answer to that question must be no. I do not know of any existing public examination system that meets all the objectives of national assessment systems'. The issue of using examination results for testing the quality of the system will be discussed in detail in the sixth chapter of the current thesis. In conclusion, the academic outcomes in the current study are of two types: continuous and categorical. For the analysis of the continuous outcomes students' grades in the examinations of June 2000 were normalised (see next section). For the analysis of the categorical outcomes, a dichotomous variable (success – failure) was created.

4.3.6. Transformation of the original examination scores

The statistical procedures for the analysis of a continuous variable – in our case the examination results – are based on certain statistical assumptions. One of them is that the distributions of students' grades do not deviate significantly from the normal

distribution. However, this does not seem to be the case for the public examinations in the year 2000 in Greece because most distributions of students' grades had negative skewness and kurtosis. Skewness is a measure of the symmetry of distribution. When a distribution is negatively skewed, the higher scores are more frequent than they should be. The normal distribution has skewness equal to zero. The concept of kurtosis is linked to the relative 'thickness' of the tails of distributions. The normal distribution has zero kurtosis. Negative values of kurtosis indicate that the distribution is platykurtic i.e. that its tails are thicker that they should be. In the current study, 94% of students succeeded in taking *lyceum* certificate. The minimum achieved grade was 7.00 and the maximum 19.90. The mean of the distribution was 14.78 with a standard deviation of 28.72. The values of skewness and kurtosis were –0.188 and –0.772 respectively.

The asymmetry of the distributions of students' grades can be explained with statistical and non-statistical terms. Statistically, a distribution is often clustered when there is an upper and a lower limit in the scale. In the Greek *lyceum* certificate, the scale has a theoretical range of 200 points (0 to 20 with one decimal point). The baseline for success is 9.50. As it was stated in the previous paragraph, the smaller score in the raw data was 7.00. Another explanation for the shape of the distributions can be found in the psychometric characteristics of the test items that were selected. Tests composed from easy items or relatively few items, produce negatively skewed distributions (Hambleton & Swaminathan, 1985). It seems that the people responsible for the implementation of the new examination system in Greece, constructed short tests that comprised relatively easy items. Most probably, the members of the examinations committee did not want the new examination system to be seen by students and parents as the juggernaut of educational failure. In the case that many students failed, it would not only be the examination system that would meet strong public opposition; the entire educational policy of the socialist government would be in jeopardy. In the current researcher's opinion, the psychometric characteristics of the test items were the main reason for the 'overproduction' of high achievers in *lyceum* certificate. The large number of students who achieved very good grades in the tests, reduced the discriminative power of the examinations. In some cases, the grades of the students that targeted university departments of high status were so close to each other that one tenth of a grade practically decided who would succeed and who would be left out. An extreme example for the 'overproduction' of high achievers in the examinations of the year 2000 is the

case of Chemistry (Sciences Direction), the distribution of which is presented in Figure 4.3.

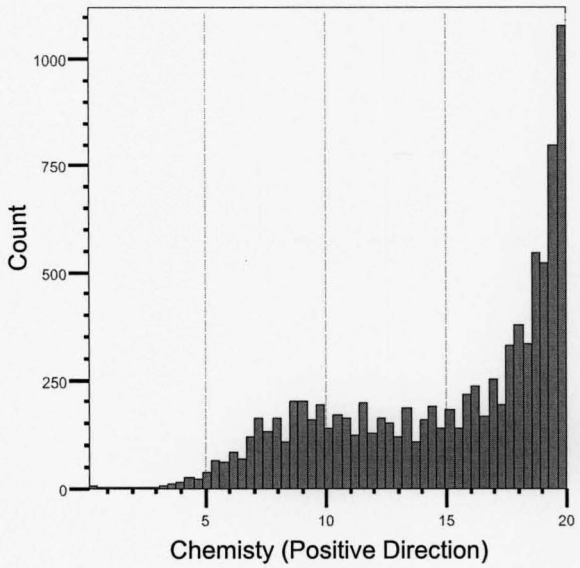


Figure 4.3. Histogram showing the distribution of students' grades in Chemistry (N= 9,382 students).

The characteristics of the distribution of Figure 4.3 are presented in Table 4.12 (for more such tables, see page 243).

Table 4.12. Descriptive statistics of the distribution of students' scores in Chemistry (N=9,382 students).

	N	Mean	Std. Dev.	Median	Mode	Percentiles					
						0	25	50	75	95	99
Chemistry (Sciences Direction)	9,382	14.9	4.5	16.3	20.0	6.8	11.1	16.3	19	19.9	20

In order to deal with the problem of asymmetric distributions, either the original grades of the students had to be adjusted or special statistical models had to be used for the analysis of the original scores. In the first case, the distances between the grades would be altered. In the second case students' grades would be grouped in two or more ordered categories and them analysed with the help of statistical techniques specially designed for ordered multilevel categorical responses. Both procedures presented advantages and

disadvantages. The first solution had the disadvantage that it would involve drastic and non-linear data transformation. However, if the normalisation of the original scores is conducted successfully, the analyst can use all the power of the statistical procedures for continuous distributions.

The grouping of the grades has the advantage of using the students' original scores. The researcher can follow the statistical procedures for analysing categorical responses from populations with multivariate multilevel structures, as they are explained, for example, in Snijders & Bosker (1999) and Goldstein (1995c). The disadvantage of using categorical responses, however, is that the grouping of the data is always subject to the analyst's judgement. Moreover, the interpretation of the findings in the case of more than two categories is extremely difficult even for experienced statisticians. Balancing the advantages and the disadvantages of each method, the normalisation of the original scores was selected as the most appropriate technique for dealing with asymmetries in the distributions of the original grades. Basic statistical theory, e.g. Ferguson & Takane (1989), says that the analysis of continuously distributed data is always preferred to the analysis of ordered ones because the models that are constructed for continuous – and normally distributed – variables are much more powerful than the models that are constructed for ordered categories.

In the current study, the analysis of the normalised students' grades gave results similar to those of another study that used categorical data as response variables. More specifically, researchers from the Economics University in Athens compared a number of schools in terms of the percentages of their students, whose average achievement fell in three ordered groups: (a) a grade lower than 15, (b) a grade between 15 and 19 and (c) a grade over 19 (Delithanasi, 2001: 7). In that study, George Panaretos, the director of the University of Economics in Athens and former Secretary General of the Ministry of Education, showed that the private schools and the large public schools had fewer students with grades lower than 15 and more students with grades over 19 (*op cit.*). Statistically significant correlation coefficients between achievement from one hand and school size and type from the other were also found in the current study but with continuous variables. Thus, at least two variables were found to explain, in a statistical sense, the variation in students' achievement, regardless of level of measurement (categorical or continuous). Technically, the normalisation of students' original grades was achieved with the use of Bloom's algorithm in SPSS. The procedure of normalisation involved the raking of the original data and the adjustment of their

relative distance so as the raw scores to correspond with the points of the standard normal distribution. Students whose scores were regarded as zeros or missing values were not included in the procedure of normalisation.

Analyses of the type of those that were presented in the two previous paragraphs have been published in Greek newspapers. So interested are the Greek people about the quality of education that articles about 'good' and 'bad' schools are always given high priority in the press. On 11 of July 2001, a Greek quality newspaper *To Vima* published a report based on current researcher's multilevel analysis, which focused on the variables that affected students' grades in the examinations of the year 2000. On 25 of July 2001 most Greek newspapers published reports based on the work of George Panaretos at the University of Economics. The tittles of the newspapers were about 'the best 40 *lyceia* in the country'. A newspaper, *Apogevmatini*, chose 'the best 40 *lyceia*' as its main story on the front page.

4.3.7. THE MEANING OF AFFECTIVE OUTCOMES AND SCHOOL PROCESSES

4.3.7.1. Methodology and research instruments

In order to investigate the impact of school processes on the academic and social outcomes of the schools, a number of statistical entities (Factors) were constructed with the help of a procedure known as Exploratory Factor Analysis (EFA). In the current study, the Factors were linear combinations of students' and teachers' responses to a number of directly posed questions. Two questionnaires were used for collecting people's responses: one for the teachers and one for the students. The bases for the construction of the questionnaires were (a) the literature on the school climate and the social environment of the school and (b) the findings of the pilot work that was conducted by the current author during 1998 – 1999. The literature on school climate has already been reviewed in the previous chapter (Section 3.7.1). As regards the pilot work during 1998 – 1999, Factor Analysis identified Factors similar to the Factors of the main study (see Table 4.15 and also Appendix in page 353). The left column of Table 4.13 contains a number of areas associated with students' views in the main study. The right column presents the corresponding questions with their numbering.

Table 4.13. The structure of the student questionnaire (1999 – 2000).

Area of investigation	Questions in the questionnaires
▪ School status	Six questions (B1 to B6)
▪ Self-perceived status	Six questions (B7 to B12)
▪ Relations with teachers	Nine questions (B13 to B21)
▪ Satisfaction from discussions on a number of issues	Four questions (B22 to B25)
▪ Relations with other students	Six questions (B2 to B31)
▪ Relation with parents	Two questions (B32 to B33)
▪ One free-response question	One question (B34)

The areas associated with teachers' views are presented in Table 4.14.

Table 4.14. The structure of the teacher questionnaire (1999-2000).

Factors	Questions in the questionnaire
▪ Collaboration and communication between staff	Fourteen questions (1 to 14)
▪ Administrational effectiveness (effective leadership and response to staff's problems)	Five question (15 to 19)
▪ Job satisfaction and morale	Eleven questions (20 to 30)
▪ Self-regulation	Eight questions (31 to 38)
▪ The subject area of the teacher (2nd and 3rd grade)	Question 39
▪ One free response question	Question 40

It has also to be stated that in both the pilot work and the main study, the current researcher had to draw a line between what was considered worth investigating in schools and what could in practice be investigated. The limits to what could be investigated were mainly set by (a) the climate of suspicion and disbelief in the schools due to the government's efforts for a new educational policy, and (b) the constraints in time and recourses for an independent study.

The questionnaires comprised different types of questions: from pre-coded closed ones to questions in which participants were asked to answer in their own words (open response). Most of the pre-coded questions were followed by what Converse & Presser (1986) have called an 'intensity items' *i.e.* sets of answers that show the degree of

agreement or disagreement with a statement. In the current study, the items were fixed answers (categories) that followed two directions. The categories were constructed so that the respondents who occupied a position (*i.e.* followed one direction) could be separated from those who only leaned towards it. In students' and teachers' questionnaires the intensity items were composed of four and in some case six ordered and mutually exclusive categories. There was no middle or 'neutral' category and because of that, there was a notional gap between the two directions of each item. In the student questionnaire, the gap was materialised with the wording of the categories (for example, a direction of 'agree' and a direction for 'disagree'). In the teacher questionnaire there was also a thin wavy line printed between the two directions. The lack of middle category is being discussed in the following paragraph. The questionnaires and their translation in English are presented in the Appendix (page 359).

The lack of the middle category in questionnaire items has been an issue of concern among many researchers. On the one hand are those who oppose the use of middle category. Converse & Presser (1986), for example, advise the social researchers not to provide a middle category, if they do not want to lose information. On the other hand, there are those who support the use of a middle or 'neutral' category. Foddy (1993), for example, warns that when no middle category is present, the answers can be biased, as in that case the neutral or ambivalent respondents are equated with those who hold a substantive answer but indicate that they do not hold it very strongly. The most important reason for not offering a middle category to the respondents of the current study was that the questionnaires were asking information that was relatively simple. Therefore, problems associated with the evaluation of hypothetical situations or the recalling of information in long-term memory were expected to be minimal. Moreover, the questions in the questionnaires were clearly defined and relevant to respondents. The use of words that were likely to invoke stereotypical reactions or misunderstandings was avoided. The teachers and the students were able to provide basic information about their everyday life in schools and, as demonstrated in the pilot work, not many ambivalent responders were found. In terms of statistical analysis, items with even numbers of ordered categories can easily split into two directions and analysed with statistical techniques appropriate for dichotomous distributions.

Table 4.15. Some issues (Factors) derived from participants' responses.

Pilot study (1998- 1999)	Main study (1999 – 2000)
Teachers	
▪ Collaboration and friendly atmosphere	
▪ Director's effectiveness	▪ Collegiality
▪ Self-effectiveness	▪ Director's effectiveness
▪ Self-regulation	▪ Self-regulation
▪ Director's support	▪ Job -satisfaction
▪ Job satisfaction	▪ Keenness
▪ Difficulties generated from students' behaviour	
▪ Work load	
Students	
▪ Academic self-image	▪ Academic self-image
▪ Teachers' support	▪ Teachers' responsiveness
▪ School status	▪ Surroundings
▪ Harmonic Relationships	▪ Competitiveness
▪ Friendships	

4.3.7.2. Exploratory Factor Analysis

In the current study, exploratory Factor Analysis (FA) was conducted for the identification of school processes. The basic idea of the current researcher was that a number of common Factors accounted for the variation of students' and teachers' answers in questionnaires. A similar research method for the investigation of school processes has been followed by other researchers in the field of school effectiveness. For example, Thomas *et al.* (1997b) conducted confirmatory factor analysis (path analysis) in order to identify affective and processes Factors in the Scottish Improving School Effectiveness Project. The theoretical principles of factor analysis that will be discussed in the following paragraphs provides the opportunity for the current author to outline a number practical issues regarding his own study. Some of these issues are (a) the size of Samples C and D, (b) the length of the questionnaires, (c) the level of measurement, (d) the reliability of the estimations, and (e) the validity of the statements that based on the statistical analysis. This present section begins from point (c): the issues related with the level of measurement.

The ordinal character of the items in the current study and, most importantly, the lack of a middle category in the pre-coded answers did not establish the perfect metric base for a Factor Analysis to be conducted. According to Stevens (1946, cited in Kim & Mueller, 1978), Factor Analysis requires that the variables have been measured at least

at the interval level. However, Kim & Mueller (1978) have shown that many ordinal variables may be given numeric values without distorting the underlying properties of Factor Analysis. The same author also states, that 'there are some encouraging comments about the use of Factor Analysis as a heuristic device even under severe measurement distortions' (*op. cit.*: 75). In theory, the degree of distortion in the metric base of Factor Analysis that is caused either by ordinal responses or of hidden dichotomies in the items decreases, as the number of categories in the items increases. A decrement of the degree of distortion is also expected in the case that the underlying correlations among the variables are of a moderate level (*op. cit.*). For the needs of the current study, it has to be shown that the directional character of the items does not distort the properties of Factor Analysis. It is encouraging therefore, that the school process Factors that emerged from the analysis were plausible and consistent both with the theory and with the findings of the pilot work. In all probability, the directional character of the items may have distorted but not destroyed the metric base of factor analysis in the current study. The Factors that were extracted in the pilot and the main study will be presented in the following paragraphs.

4.3.7.3. The rotated factor analytic solution

In the pilot study, the Factors were extracted with the method of Principal Components and rotated with the method of *Varimax*. The meaning of Factors' extraction and rotation will be explained in the next section. The names of the Factors of the pilot work can be seen in the Appendix (page 353). The 11 student Factors are: (a) academic self-image, (b) teachers support, (c) school status, (d) home behaviour, (e) parents caring, (f) harmonic relationships with others, (g) easiness of work at school and home, (h) self efficacy (perceived), (i) friendships. There were also two unidentified Factors *i.e.* Factors not easy to name. The analysis of the teacher questionnaire resulted in the following 10 Factors: (a) friendly atmosphere and collaboration (b) perceived directors' effectiveness, (c) perceived self-effectiveness, (d) self-regulation, (e) director's support, (f) job satisfaction, (g) behavioural difficulties, (h) easiness of work. Another two Factors that were extracted remained unidentified. The findings of the pilot study were presented in a conference held at the University of Patra (Greece) and published in a book about educational evaluation (Bagakis, 2001).

In the main study, nine Factors were identified: four from students' questionnaires and five from teachers' questionnaires. The method that was followed for the extraction of

the Factors was the *generalised least squares*. The method for the rotation of the Factors was the *direct oblimin*. Both of these methods will be explained in the next section. The names of the four student factors are (a) 'teacher responsiveness', (b) 'surroundings', (c) 'academic self-image', and (d) 'rivalry'. The names of the five teacher Factors are (a) 'directors' effectiveness', (b) 'self-regulation', (c) 'collegiality', (d) 'job satisfaction', and (e) 'keenness'. The description of the Factors and their loadings are presented in Table 4.16 and Table 4.18.

The Factors that were extracted in the main study may be considered to tap very important issues in every education system. However, one must not forget that Factors are purely statistical entities and therefore their construct validity can only probabilistically be verified. The research instruments (questionnaires) that were used in the current study should be considered only as case of a larger and undocumented universe of similar research instruments. According to Kim & Mueller (1978), the observable variables in a factor analytic design are in fact a subset of a potentially larger domain of relevant variables. It must be noted that the current study did not aim at the construction of a generic research tool for investigating school processes in different educational contexts. The readers of the current work can find many such research instruments in the book *School Climate* that has been edited by Freiberg (1999). The interpretation of the Factors that are presented in the current study must be made in the light of the literature that has been reviewed and the items that have statistically been associated with each Factor. The meaning of the Factors may be different in the context of different educational systems.

The left column of Table 4.16 and Table 4.18 presents descriptions of the questions in student and teacher questionnaire respectively. The capital letters before the descriptions indicate the specific part of the questionnaire from which the questions have been taken. The numbers in the rows indicate the position of the question in the questionnaires. Thus, 'B_8' indicates the eighth question in part B of a questionnaire. The capital 'R' beside the number of some of the questions indicate that the direction of the intensity item for these specific questions had originally had the positive category coded '1' and the negative category coded '4'. Normally, the categories that described the best educational practice were coded '4' and were printed on the right side of the questionnaire. By haphazardly changing this pattern, the current researcher tried to reduce the possibility of some students answering carelessly without, paying much

attention to the content of the questions. Later, all the items were re-coded in the same direction *i.e.* '1' for the negative practice and '4' for the positive practice.

The Greek symbol alpha ('α') in the right column of Table 4.16 and Table 4.18 represents the reliability coefficient of the corresponding scales for each Factor. Nunnally (1978, in Kline, 1994b) describes the reliability coefficient as 'the average correlation of one test, or one item, with all the tests or items in the universe' (p. 34). In the current study, Cronbach's *alpha* reliability coefficient was used for evaluating the internal reliability of the items. As a measure of internal reliability, Cronbach's *alpha* assumes that there is a true score causing the variance in a set of items. It also assumes that the items are caused by one, and only one, underlying construct and that each item measures the underlying construct equally. Thus, the degree to which the items are correlated is the variance of the true score. The formula for Cronbach's *alpha* is presented in the Appendix (p. 355). With the exemption of the Factor 'rivalry between students', all the other scales have medium to high values for the *alpha* coefficient.

Table 4.16. Pattern matrix of Factors derived from student questionnaire.

Description of the question in the questionnaire	Loading	Factor's name
B_11 (the classes are interesting)	0.429	
B_13R (the teachers are rewarding)	0.504	F1: 'RESPONSIVE
B_15 (the teachers are friends)	0.364	TEACHER BEHAVIOUR'
B_17R (teachers help students to understand)	0.619	(students'
B_18R (the teachers are interested in what students say)	0.617	perspectives)
B_19R (the teachers give feedback to students)	0.654	($\alpha = 0.67$)
B_20 (the teachers *do not* discriminate in the classroom)	0.459	
B_32R (communication between school and home)	0.207	
B_1R (liking the school building)	0.633	F2:'SURROUNDINGS'
B_2 (association with the school)	0.254	(the neatness of
B_4R (order in the school environment)	0.655	the school environ-
B_5R (satisfaction from the condition of the classroom)	0.806	ment) ($\alpha = 0.66$).
B_10R (helping the teachers in their lectures)	0.350	F3: 'ACADEMIC
B_7 (good academic self-image)	0.720	SELF-IMAGE'
B_8 (doing all the homework)	0.637	($\alpha = 0.66$)
B_9R (answering teachers' questions in the classes)	0.593	
B_14R (the teachers are ironic in the class)	0.294	F4: RIVALRY
B_27R (being offended by other students)	0.497	(between students)
B_28R (being offensive to other students)	0.335	($\alpha = 0.40$)
B_29R (unwanted cultures in the school)	0.357	
B_31R (flattering teachers in order to achieve higher grades)	0.336	

Note: N = 991 students in 33 schools. Extraction method: *Generalised Least Squares*. Rotation method: *direct oblimin* with $d = 0$. Goodness of fit criterion: χ^2 (*d.f.* 132) = 380.299, $p = 0.000$ (for a discussion on the probability of χ^2 see Section 4.3.7.6). Questions followed by 'R' have been recoded.

The four Factors of Table 4.16 are correlated. Their correlation coefficients are presented in the following table.

Table 4.17. Correlation matrix of students' Factors.

	RESPONSIVE TEACHER BEHAVIOUR	SURROUNDINGS	ACADEMIC SELF-IMAGE
RESPONSIVE TEACHER BEHAVIOUR	1		
SURROUNDINGS	0.348	1	
ACADEMIC SELF-IMAGE	-0.417	-0.090	1
RIVALRY	0.186	0.133	-0.030

Table 4.18. Pattern matrix of Factors derived from teacher questionnaire.

Description of the question	Loading	Factor
B_17 (the director takes initiatives)	0.923	G1: DIRECTOR'S EFFECTIVENESS (α= 0.90)
B_15 (the director is supportive)	0.851	
B_16 (the director keeps teachers informed)	0.763	
B_18 (the director understands teachers' idiosyncrasies)	0.743	
D_32 (discretion to choose teaching strategies)	0.906	G2: SELF-REGULATION (α = 0.80)
D_31 (discretion to choose teaching materials)	0.761	
D_34 (discretion to assign the proper amount of homework)	0.613	
D_33 (keeping the classes well disciplined)	0.495	
A_10 (count on colleagues' support)	0.818	G3: COLLEGIALITY (α = 0.88)
A_8 (accepting each other)	0.793	
A_9 (frequent agreement in teachers' council)	0.772	
A_11 (sharing the same views with most of the colleagues on educational issues)	0.686	
A_13 (fit in well with colleagues)	0.68	
A_14 (the school as a big family)	0.605	
A_6 (frequent discussions on educational issues in the staff room)	0.505	
C_20 (satisfied from the level of a teacher's salary)	0.822	G4: JOB SATISFACTION (α = 0.69)
C_22 (satisfied from teacher's living standards)	0.767	
C_21 (satisfied from the other rewards of the teaching profession)	0.368	
C_24 (finding teaching to be an exciting job)	0.664	G5: KEENNESS (α = 0.73)
C_23(enjoying teaching this year 1999-2000)	0.633	
C_27 (providing an ideal type of education)	0.525	
C_26 (significant others appreciate respondent's work)	0.480	

Note: -N = 223 teachers in 38 schools. Extraction method: *Generalised Least Squares*. Rotation method: *direct oblimin* with d = -0.08. Goodness of fit criterion: χ^2 (*d.f.* 131) = 158.085, p = 0.054.

The five Factors of Table 4.18 are correlated. Their correlation coefficients are presented in the following table.

Table 4.19. Correlation matrix of teachers' Factors.

	DIRECTOR'S EFFECTIVENESS	SELF-REGULATION	COLLEGIALITY	SATISFACTION
DIRECTOR'S EFFECTIVENESS	1			
SELF-REGULATION	0.115	1		
COLLEGIALITY	0.216	0.078	1	
SATISFACTION	0.123	0.089	0.105	1
KEENNESS	0.169	0.379	0.215	0.226

The numbers in the middle column of Table 4.16 and Table 4.18 are the correlation coefficients between the variables in the left column and the corresponding Factors in the right column. Very small loadings – *i.e.* those with an absolute value less than 0.2 – have been omitted from the two tables for reasons of simplicity of presentation. Thus, in both tables the complexity of the factor analytic solution seems to be equal to 1 (*i.e.* each variable seems to correlate with only one Factor). Strictly speaking, however, this is not quite true because both Table 4.16 and Table 4.18 are the 'pattern' matrixes and not the 'structure' matrixes. As pattern matrixes, they present the unique contribution of each variable to the rotated factor analytic solution, without taking into account any correlation between the Factors. The role of Table 4.17 and Table 4.19 is therefore to present this correlation between the Factors of Table 4.16 and Table 4.18 respectively.

4.3.7.4. The rotation of the Factors

The rotation of the Factors is a necessary procedure in order their relation with the directly observed variables to be simplified. By adjusting the relations between the Factors and the corresponding variables, the Factors are given meaning. In Exploratory Factor Analysis, the rotation of the Factors is achieved with special mathematical algorithms that help the analyst to choose the most appropriate Factor structure from a universe of equivalent Factor structures. The rotation algorithm that was used in the current study was *direct oblimin*, a method that will be explained in the following paragraph. What must be stressed here, is that the Factor loadings in Table 4.16 and Table 4.18 are not the standardised regression coefficients because, as it has been already stated, these tables represent pattern matrixes. Nevertheless, the correlations in the middle column of the tables are sufficient in giving meaningful names to the Factors.

As it was stated in the previous paragraph, oblimin algorithm was used for the rotation of the Factors. If it had not been for oblimin, the researcher could have used another approach for Factors' rotation, for example to focus on a prearranged pattern matrix. This approach was not followed because it would need (a) accurate prior knowledge about the nature of the Factors and (b) special statistical packages to deal with the necessities of Confirmatory Factor Analysis. These two elements were not available in the current study. As regards precise prior knowledge about school processes in the Greek context, the lack of relevant studies in the literature is notable. As the investigation of school processes in the current study had an exploratory character,

oblimin was preferred on because it provided a standard method of rotation, free of the researcher's subjective judgements. In order to understand the advantages of oblimin over other methods of rotation (e.g. the Varimax method), we may consider the four student Factors and the five teacher Factors as geometrical axes in four- and five-dimensional spaces respectively. If variables were dots in these multidimensional spaces, oblimin would rotate the axes in such an oblique manner so as that each dot to be strongly associated with only one dimension. For example, Figure 4.4 presents the directly observed variables of Table 4.16 as dots in a space with three dimensions. Factors F1, F2 and F3 are the reference axis in this three-dimensional space. We can clearly see that four dots (grouped in the central circle) have high values in the vertical axis (F2) but almost zero values in the other two axes. These four dots are the four variables which construct the Factor 'surroundings'.

The formula of oblimin that was used in the current study was that of 'direct oblimin', which was developed by Jennrich & Sampson (1966). In the current study, the basic idea behind direct oblimin is that if there are definable clusters of variables representing separate school processes, each cluster will have near-zero loadings on all the primary Factors except one. In the formula of direct oblimin, a special computational algorithm is used to reduce a criterion that it has been named 'D'. Both the formula of direct oblimin and the 'D' criterion are presented in the Appendix (p. 356). In the algorithm for direct oblimin, the analyst can control the magnitude of factors' obliqueness by adjusting the sign and the magnitude of a coefficient named '*d*'. Negative values of d make the axes more orthogonal and decrease the correlation between the Factors, whereas positive values of d make the axes more oblique and increase the correlation between the Factors. As Kim & Mueller (1978) stated for the relation between a Factor's pattern and the value of *d*, 'if the factor pattern is unifactorial (the simplest possible), the specification of $d = 0$ identifies the correct pattern' (p. 39). In the current study, the value of d for students and teachers was 0 and –0.08 respectively.

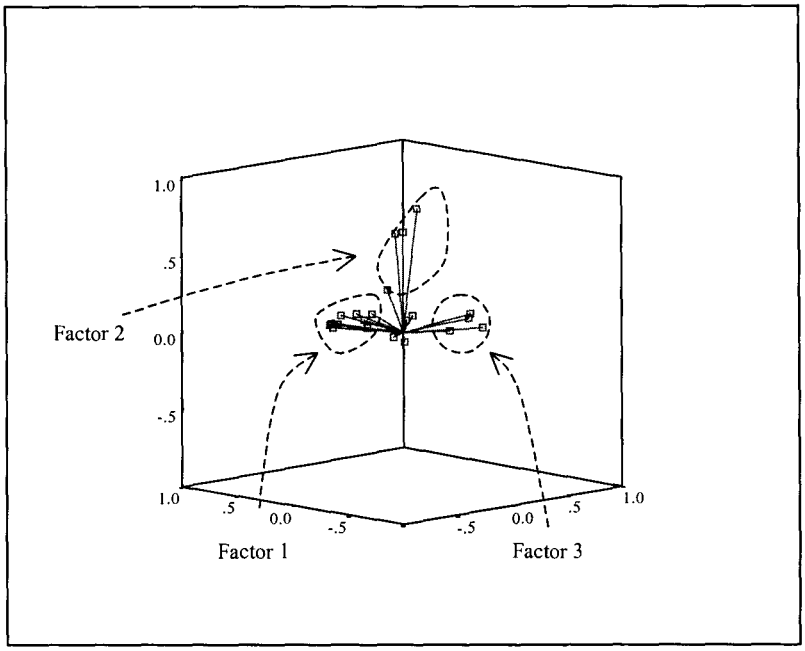


Figure 4.4. Students' Factors 1, 2 and 3 as axes in rotated space.

4.3.7.5. The extraction of the Factors

Another issue of great importance as regards the statistical construction of school processes, is the initial extraction of the Factors. Although Factors' extraction precedes their rotation, the order has changed in this chapter for making the presentation clearer. From a procedural point of view, the current researcher had to decide on two things: (a) if Factors or Components would be extracted, and (b) what the number of these Factors or Components would be. The first of these two points will be discussed later. As regards point (b), the least squares method for extraction was used. The idea behind this method, as Kim & Mueller (1978) explain, is to minimise the residual correlation in participants' responses, after extracting a given number of Factors, and to assess the degree of fit between the reproduced correlations under the model and the observed correlations. For the objectives of the current study, the method of least squares had certain advantages over other methods of extraction. Firstly, – and this is related to the point (a), above – it represented the structure of people's answers in terms of a number of causal Factors *i.e.* statistical constructs that 'cause' the variance in the directly observed variables. On the contrary, in deriving the components in the Principal Components analysis one need not to consider causation. Secondly, least squares

provided a 'built in' test of how well the Factors represented the correlation in people's answers. The analysis showed that the Least Squares solution had a good fit to the observed data as regards the five teachers' Factors. For the four student's Factors, however, least squares gave a poor fit. The problem of lack of fit must therefore be discussed before proceeding with the statistical analysis of the data. This discussion will also provide an opportunity to present other characteristics of the current study.

4.3.7.6. The fit of the factor analytic model

The degree to which the extracted Factors reproduce the correlation matrix of the initially observed variables in a factor analytic design is called 'goodness of fit'. Statistical theory provides a number of tests and criteria for evaluating goodness of fit in Factor Analysis. The most commonly used goodness of fit criterion is 'U_k', which follows the χ^2 distribution. The subscript 'k' in the criterion refers to the number extracted factors. The formula of U_k is presented in the Appendix, in order to show that U_k is a function of the sample size, whereas its degrees of freedom are independent of the sample size. In the current study, the value of U_5 for the five Factors that derived from teachers' responses had 131 degrees of freedom and its value was not significant ($\chi^2 = 158.08, p = 0.054$). This means that the factor analytic model for the teachers has a good fit. However, the value of U_4 for the four Factors that derived from students' responses was highly significant, meaning that the factor analytic model for the student did not have a good fit. This may indicate either that more than four factors should be extracted or that the number of Factors was correct but χ^2 was significant due to the relatively large sample size that was used (Sample C). Kim & Mueller (1978) state that although U_k is appropriate when the sample size is large, minor deviations may be statistically significant when the sample is 'very' large (p. 22). What is, however, a 'very large' size in Factor Analysis? This question will be answered in the following paragraphs.

Although the literature on sample size in Factor Analysis is very rich, there is not a generally accepted rule on how many observations are sufficient for factor analytic designs. Guildford (1956), one of the firsts to write about sample size in Factor Analysis, argued that 200 observations is the minimum. Kelloway (1998) shares the same opinion with Guildford (*op. cit.*), especially for models of moderate complexity. Kline (1994a), however, founds 200 observations to be a very 'pessimistic' number. According to him (*op. cit.*), in data with a clear factor structure samples even as small as

100 are sufficient. Hair, *et al.* (1995) argue that a researcher should not factor analyse a sample of fewer than 50 observations, and preferably the sample size should be 100 or larger. Sample size, however, is not the only important issue in a factor analytic design: the subject to variable ratio is equally important. In the statistical literature, there are various claims about the subjects to variables ratio in factor analytic designs running from 2:1 to 10:1. Generally, Hair *et al.* (1995) claim that a researcher has to have at least five times as many observations as there are variables to be analysed. In the current study, the observation to variables ratio (Sample C) was 47:1. The possibility, therefore, to find statistically significant U_k due to sample size was large[1].

In order to investigate the hypothesis that the value of U_4 was a result of the sample size and not a result of poor model fit, the current researcher used the statistical program to randomly select 208 cases (20%) from the initial sample. The analysis was repeated and this time the value of U_4 was not statistically significant ($\chi^2 = 154.25$, $d.f. = 132$, $p = 0.090$). In the 208 observations, the model had a good fit and, in addition, the Factor pattern matrix was similar to the pattern matrix for the 991 valid observations of Sample C. It can therefore be inferred that the factor analytic model in the case of students' responses gave a good picture of the underlying structure and that the poor fit that was found for the 991 observation was simply a result of large sample size. It now remains to be shown that the small samples of the current study, *i.e.* the 208 randomly selected students and the 223 teachers of Sample C, were adequate to be factor analysed.

According to Kaiser (1970), the quality of the sample in Factor Analysis depends on four conditions: (a) the number of variables, (b) the number of common factors, (c) the number of observations, and (d) the strength of the relationship among the variables. The first three of Kaiser's (1970) conditions have already been discussed in this section. As regards the fourth condition, the strength of the relationships among the variables, an indicator of the strength of these relationship, the Bartlett's Test of Sphericity, was used. Bartlett's Test of Sphericity (BTS) checks the hypothesis that all the diagonal terms of the initial correlation matrix are 1 and all the off diagonal terms are 0. The values of the BTS for the initial sample of the 991 students, the random sample of 208 students, and the sample of 223 teachers were all statistically significant. Another important index is the Kaiser-Meyer-Olkin Measure of Sampling Adequacy (MSA), which was developed

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[1] On the other hand, the possibility of the students' responses to construct sample specific school processes was very small.

by Kaiser in the 1970's (1970, 1974). The formula of the MSA is presented in the Appendix (p. 356). Kaiser (1974) characterises measures of MSA higher than 0.90 as 'marvelous', between 0.80 and 0.90 as 'meritorious' and between 0.70 and 0.80 as 'middling'. The base line of the Measure of Sampling Adequacy, under which the sample is unacceptable, is 0.50. In the current study, the MSA for the 991 students was 0.787. For the 223 teachers (Sample D) the MSA was 0.844. For the random sample of 208 students the MSA was 0.746. Since all the MSA measures in this study were over 0.70, the data were considered adequate for Factor Analysis.

Reflecting on the material presented so far in this section, it can be argued that the current researcher took all the available steps in order to construct factor analytic models that would represent the underlying Factor structures. The final step in Factor Analysis was to constructions of Factors' scales. Factors' scales were constructed in order the derived process Factors to be used as independent (predictor) variables in hierarchical linear models. In the current study, Factor scales were constructed with the method of Regression. The criterion of this method is to find a Factor scale in such a way that the correlation between the underlying common Factor and the scale to be maximum. Regression is not the only method for constructing Factor scales but it is the most commonly used by statisticians. However, the choice of the appropriate method for constructing Factor scores is not held to have a major impact on the findings. Kim & Mueller (1978) state that there is usually a very high correlation among the scales produced by different scaling methods and that 'for many research problems the choice of the method may be academic' (p. 69). The formula of the regression method is given in the Appendix (p. 357). With the construction of the Factor scores, the first phase of the statistical analysis was over. In the second phase, hierarchical statistical models were conducted. A brief description of these models will take place in the following section.

4.4. MULTILEVEL STATISTICAL MODELS

4.4.1. THE GENERALISED LINEAR MODEL AND ITS NOTATION

In the previous chapter, it was stated that statistical procedures which deal with hierarchical data structures are an active area of educational research from the 1980s onwards. Education is a field in which hierarchies in the data are the rule rather than the exception. Apart for education, however, the conceptualisation of data structures as hierarchical has also been proved to be of value in other contexts as growth models (see Bryk & Raudenbush, 1987) and research meta-analyses (see Raudenbush & Bryk, 1985). The purpose of Section 4.4 is to present the logic and the main features of the hierarchical (or multilevel) statistical models. By presenting the logic of these statistical models, the current researcher will have the opportunity to explain his findings more clearly in the next chapter.

Statisticians call the hierarchical linear models 'linear' because the sum of their parameters is specified to be a straight line and 'hierarchical', because these models are commensurate with the hierarchical nature of some kinds of data. Non-linear multilevel models as well as hierarchical models for cross-classified random data structures have been recently developed by Harvey Goldstein (1991) at the London Institute of Education. In the literature focusing on hierarchical models, most books contain complex statistical formulas written for students and researchers with a strong mathematical background. Such a book is *Multilevel Statistical Models* by Goldstein (1995c) which makes extensive use of Matrix Algebra. However, there are also books written for students and researchers with a more applied approach to multilevel statistical analysis. Such a book is *Multilevel Analysis* by Snijders & Bosker (1999) which explains the hierarchical statistical models to researchers in the fields of social sciences and includes many example from education. In the remaining part of Section 4.4 the current researcher will present a selection of topics taken directly from the book *Multilevel Analysis*. The current author has also followed the notation found in the book by Scnijder & Bosker (1999). More specifically, abstract and random variables are denoted here by italicised capital letters, like X or Y. Outcomes of random variables and other fixed values are denoted with italicised lowercase letters. Finally, matrixes and

vectors are denoted by bold capital and bold lowercase letters respectively. Before presenting the logic of the multilevel models let us present the basic linear model.

In the basic statistical theory, the matrix notation of the generalised linear model is:

$$\mathbf{Y} = \mathbf{X}\boldsymbol{\beta} + \boldsymbol{\varepsilon}$$

In the above equation, $\mathbf{Y}$ is a $n \times p$ matrix of observations on, say, p dependent or 'response' variables for n cases, $\mathbf{X}$ is a $n \times q$ matrix of q independent or 'explanatory' variables for n cases, $\boldsymbol{\beta}$ is a $p \times q$ coefficient matrix of parameters to be estimated and $\boldsymbol{\varepsilon}$ is a matrix of random errors, whose rows for a given X are uncorrelated, each with a mean of zero, and common variance-covariance matrix $\boldsymbol{\Sigma}$. Rowe (1989) has pointed out that for a statistical model to be commensurate to substantive theory, the researchers must consider four things: (a) the structural relationship between dependent and independent variables, (b) the sampling structure of the derived data, (c) the levels of measurement and aggregation, and (d) the measurement properties of the observations.

The structural relationship between dependent and independent variables in this analysis is considered to be linear. The sampling structure and the measurement properties of the observations have already been discussed in the previous sections of this chapter. The hierarchical linear models that were mentioned in the previous paragraph were used in order to deal with Rowe's (1989) third point *i.e.* the level of measurement and aggregation of the data. From this point of view, the current study has two levels of measurement: the level of schools (level-2) and the level of students (level-1).

4.4.2. THE LOGIC OF HIERARCHICAL LINEAR MODELS

For the needs of the current study, let the academic outcome of the i^{th} student in the j^{th} school be denoted as Y_{ij}. With the help of these subscripts, Snijders & Bosker (1999: 41) write the basic multilevel model as:

$$Y_{ij} = \beta_{0j} + \beta_1 x_{ij} + R_{ij} . \qquad \textbf{4.1}$$

Model 4.1 looks like an ordinary linear regression model in which β_{0j} is the intercept term, β_1 is the coefficient of x_{ij}, and R_{ij} is the error term. Snijders & Bosker (1999) note that subscript 'j' in β_{0j} is what makes Model 4.1 'multilevel'. Specifically, subscript 'j' indicates that the intercept term of Model 4.1 is not fixed but random at

school level. This means that rather than estimating a common intercept for all the schools or a separate intercept β_0 for each school, special algorithms and statistical packages have now been developed that allow the researchers to 'borrow strength' across higher level units – in our case, schools. Snijders & Bosker (1999: 41) express the random intercept of Model 4.1 as $\beta_{0j} = \gamma_{00} + U_{0j}$, where γ_{00} is a fixed intercept term and U_{0j} is the error term of the intercept. By substituting $\beta_{0j} = \gamma_{00} + U_{0j}$ to Model 4.1, Snijders & Bosker (*op. cit.*) write Model 4.1 as:

$$Y_{ij} = \gamma_{00} + \gamma_{10} x_{1ij} + (U_{0j} + R_{ij}) . \qquad \textbf{4.2}$$

Graphically, this solution could be presented by many parallel straight lines, each one of which would represent a school. Model 4.2 is now a hierarchical linear model with two parts: a random part in the parenthesis and a fixed part preceding the parenthesis. According to Snijders & Bosker (1999) the interpretation of the coefficients the fixed part is straightforward: γ_{00} is the intercept term for the average school in the sample and one unit increase in the value of X is associated with an average increase of γ_{10} units in the value of Y. The random part of Model 4.2 is also very interesting. U_{0j} refers to school level error, whereas R_{ij} refers to error at student level. Snijders & Bosker (1999) as well as Goldstein (1995c) explain that these two errors are uncorrelated and their expectation, given the value of the explanatory variable X, is equal to 0. On page 48 of the book *Multilevel Analysis*, Snijder & Bosker denote the population variance of U_{0j} by τ_0^2 and the population variance of R_{ij} by σ^2. Due to the fact that U_j and R_{ij} are – by design – uncorrelated and given the value of X, the total variance in Y is denoted by Snijder & Bosker (1999: 48) as $\text{var}(Y_{ij}/x_{ij}) = \text{var}(U_{0j}) + \text{var}(R_{ij}) = \tau_0^2 + \sigma^2$. The covariance between two different students (i and i', with $i \neq i'$) in the same school is $\text{cov}(Y_{ij}, Y_{i'j}/\chi_{ij}, \chi_{i'j}) = \text{var}(U_{0j}) = \tau_0^2$ (*Ibid.*). Thus, the correlation between i and i' is:

$$\rho(Y_{ij}, Y_{i'j}) = \frac{\tau_0^2}{(\tau_0^2 + \sigma^2)} . \qquad \textbf{4.3.}$$

In the statistical literature, the ρ parameter in equation 4.3 is called the *intra-class correlation coefficient*. Because the current study deals with students nested in schools, ρ represents the *intra-school correlation coefficient*. The ρ coefficient can be interpreted as Pearson's correlation between two randomly drawn students in one randomly drawn school, controlling for the explanatory variables. It can also be interpreted as the fraction of the total variability that is due to school participation. In

other words, ρ represents an estimate of the 'school effect' on a given school outcome (Snijders & Bosker, 1999).

What would be the consequences of ignoring the existence of the 'school effect'? If the data of the hypothetical example that was presented above were analysed with the method of Ordinary Least Squares, the correlation between the student level error terms would be ignored and thus the estimates of the parameters would be biased. In the alternative case that the data were aggregated to school level, it would be possible to use Ordinary Least Squares in order to estimate the parameters for the aggregated data. In that case, however, the relationship between the aggregated variables might be different from the relationships at student-level, a phenomenon known in the statistical literature as 'ecological fallacy' (see Langbein & Lichtman, 1978). Of course, the intercepts can always be seen as separate fixed parameters to be estimated (*i.e.* a different coefficient for each school). This solution however would contradict the principle of model simplicity because a researcher would then have to estimate a large number of parameters. In the case of the current work, for example, 375 intercepts would have to be estimated. In the alternative case that a model with the specifications of Model 4.2 was fitted to the data of the current study, only four terms would have to be estimated: the fixed coefficients γ_{00} and γ_{10}, and the variances τ_0^2 and σ^2. In this alternative case, the schools of the current study could also be seen as a sample of a wider population of schools.

Model 4.2 could be expanded to include more than one explanatory variable. If, for example, there were p explanatory variables at individual level and q explanatory variables at school level (to use Snijders' & Bosker's 1999 notation), Model 4.2 could be written as:

$$Y_{ij} = \gamma_{00} + \gamma_{10}x_{1ij} + \cdots + \gamma_{p0}x_{pij} + \gamma_{01}z_{1j} + \cdots + \gamma_{0q}z_{qj} + U_{0j} + R_{ij} \qquad \textbf{4.4}$$

The regression parameters in Model 4.4 have the same interpretation as non-standardised regression coefficients in Ordinary Least Squares multiple regression models.

4.4.3. More complex hierarchical models

Snijders & Bosker (1999) explain that if Model 4.1 was expanded so as to include a random coefficient not only for the intercept but also for variable X, β_1 would be

written β_{1j} and the hierarchical model would then have random slopes as well as random intercepts. In that case, the two school dependent coefficients would be separated into an average coefficient and a school-dependent variation. This is written by Snijders & Bosker (1999: 67) as follows:

$$\beta_{0j} = \gamma_{00} + U_{0j}$$
$$\beta_{1j} = \gamma_{10} + U_{1j}. \qquad \textbf{4.5} \text{ (a \& b)}$$

Using again Snijders' & Bosker's (1999:68) notation, substitution of the above equations to 4.1 would lead to the model:

$$Y_{ij} = \gamma_{00} + \gamma_{10} x_{1ij} + U_{0j} + U_{1j} x_{ij} + R_{ij} \qquad \textbf{4.6}$$

In Model 4.6, the term $U_{1j} x_{ij}$ can be regarded as the random interaction between schools and the explanatory variable X. In this case, X allowed to have a 'random effect' on outcome Y. Snijders & Bosker (1999: 68) write that in this case 'the variance of Y, given the value x of X, depends on x'. The authors present an example of this situation in the book *Multilevel Analysis*: the case in which socio-economic status (SES) has an effect on academic achievement (Y) but only for students with low SES. According to Snijders & Bosker (1999) in that case, there is no significant school effect for students from a high socio-economic background but there is significant school effect for students from low socio-economic background. The authors inform their readers that in the statistical literature this phenomenon is called *heteroscedasticity*.

For Snijders & Bosker (*op. cit.*) the most common situation in multilevel models is for the two school level error terms to be correlated. Thus the authors on page 68 of the book Multilevel Analysis write the variances and covariance of the level-two residuals of Model 4.6 as follows:

$$\text{var}(U_{0j}) = \tau_{00} = \tau_0^2$$
$$\text{var}(U_{1j}) = \tau_{11} = \tau_1^2$$
$$\text{cov}(U_{0j}, U_{1j}) = \tau_{01}$$

Snijders & Bosker (1999) highlight two interesting points about random slopes models. Firstly, in these models the slopes are normally distributed round their mean γ_{10}, with standard deviation $\tau_1 = \sqrt{\tau_1^2}$. This means that approximately 95 percent of the groups (schools) have slopes within the $\gamma_{10} \pm 2\tau_1$ range (*op. cit.*). Secondly, in random slope

models the within group coherence cannot be expressed by the intra-class correlation coefficient that was defined with Equation 4.3. According to Snijders & Bosker (1999) this is due to the fact that the correlation between individual i and individual i' in school j depends on the explanatory variable X. According to the authors (*op. cit.*), in this case, the variance is considered to be the sum of the variances of all random variables in the model plus a term depending on the covariance between U_{0j} and U_{1j}. Finally, Snijders & Bosker (1999) discuss the case in which the coefficients β_{01} and β_{1j} are predicted from a school-level variable Z. The authors explain that in this case the coefficients of Model 4.5 (a and b) could be written as:

$$\beta_{0j} = \gamma_{00} + \gamma_{01} z_j + U_{0j}$$
$$\beta_{1j} = \gamma_{10} + \gamma_{11} z_j + U_{1j} \quad \text{(from Snijders \& Bosker, 1999: 73)}$$

Substitution to basic multilevel Model 4.1 gives:

$$Y_{ij} = \gamma_{00} + \gamma_{01} z_j + \gamma_{10} x_{1ij} + \gamma_{11} z_j x_{ij} + U_{0j} + U_{1j} x_{ij} + R_{ij}. \qquad 4.7$$

Model 4.7 indicates that by explaining intercept β_{0j} by the level-two variable Z, the main effect of Z is included in the model. On the other hand, by explaining coefficient β_{1j} by Z, the interaction effect of X and Z is included in the model. In the statistical literature, this interaction is called 'cross level interaction' (*Ibid*).

4.4.4. MULTIVARIATE HIERARCHICAL MODELS

In the 13th chapter of the book *Multilevel Analysis*, Snijders & Bosker (1999) present the notation and the logic of the multivariate hierarchical models. These models are sometimes used in the case that there are more than one response variables for the same level-1 unit. For example, a researcher may be interested in students' achievement in Physics and Mathematics simultaneously. In this case, if might be sensible for the researcher to see the joint distribution of these two subjects. Snijders & Bosker (1999) present four reasons why it is sometimes preferable to consider the joint distribution of a collection of outcomes. The authors state that with multivariate-multilevel analysis:

1. Conclusions can be drawn about the correlations between the dependent variables and most importantly, about the extend to which the correlations depend on the individual and on the group level.
2. The tests for specific effects for single dependent variables are more powerful in multivariate analysis, especially in the cases that the dependent variables are strongly correlated.

3. It is possible test whether the effect of an explanatory variable on response variable Y_1 is larger that its effect on Y_2, when the data on Y_1 and Y_2 were observed (totally or partially) on the same individuals.
4. The joint effect of an explanatory variable on several response variables can be tested without capitalising on chance – a situation that is inherent to carrying out a separate test for each response variable (Snijders & Bosker, 1999: 201).

Snijders & Bosker (1999) and Goldstein (1995c) explain that the technique for conducting multivariate multilevel analysis is to see individuals as level-two units, groups as level-three units and observations as level-one units. Thus, the measurement on the h^{th} variable for student i in school j is denoted Y_{hij}. In the case that there are m response variables and p explanatory variables at individual or group level, Snijders & Bosker (1999: 201) express the response variable Y_h as:

$$Y_{hij} = \gamma_{0h} + \gamma_{1h}x_{1ij} + \gamma_{2h}x_{2ij} + \cdots + \gamma_{ph}x_{pij} + U_{hj} + R_{hij} \qquad \textbf{4.8}$$

Model 4.8 is similar to Equation 4.4 expect that in 4.8 the levels are three and the coefficients have now acquired the subscript 'h'. This is because the coefficients in Model 4.8 refer to the h^{th} response variable. Note that for reasons of simplicity of presentation, the Snijders & Bosker use double and not triples subscripts for the coefficients in Model 4.8. The elements of the random part of 4.8 are U_{hj} and R_{hij}, as in Equation 4.4. However, Snijders & Bosker (1999) explain that as variables Y_1 to Y_m are measured on the same individuals, their dependence can be also taken into account. This means that terms U_{hj} and R_{hij} can respectively be seen as components in two following vectors which are presented by Snijders & Bosker (1999: 208) as follows:

$$\mathbf{U_j} = \begin{pmatrix} U_{1j} \\ \vdots \\ U_{mj} \end{pmatrix} \text{ and } \quad \mathbf{R_{ij}} = \begin{pmatrix} R_{1ij} \\ \vdots \\ R_{mij} \end{pmatrix}$$

Snijders & Bosker (*op. cit.*) explain that in multivariate hierarchical models instead of residual variances at level 1 and 2, there are two residual covariance matrices, $\mathbf{T}=\text{cov}(\mathbf{U_j})$ and $\mathbf{\Sigma} = \text{cov}(\mathbf{R_{ij}})$ respectivelly. The authors describe matrix **T** as the *residual between group covariance matrix*, and matrix $\mathbf{\Sigma}$ as the *residual within groups covariance matrix*. The covariance matrix of the complete observations, conditional on all the explanatory variables, is thus the sum of matrixes $\mathbf{\Sigma}$ and **T**, *i.e.* $\text{var}(\mathbf{Y^c}) = \mathbf{\Sigma} + \mathbf{T}$ (*Ibid.*).

Statistical packages that deal with multilevel models can easily deal with multivariate data structures with the help of dummy variables which are specially constructed at level-one in order simply to indicate the response variables. Snijders and Bosker (1999) present this technique more formally by considering a situation in which there are m response variables in a multilevel analysis. In that case, m dummy variable are constructed, one for each response variable. For a specific observation, dummy variable d_h is either 1 or 0, depending on whether the observation refers to response variable Y_h or to one of the other response variables. This is formally expressed by Snijders & Bosker (1999: 202) as: $d_{shij} = \begin{cases} 1 & \text{if } h = s \\ 0 & \text{if } h \neq s \end{cases}$.

With the help of dummy variables, Model 4.8 can be expressed (*Ibid.*) as:

$$Y_{shij} = \sum_{s=1}^{m} \gamma_{0s} d_{shij} + \sum_{k=1}^{p} \sum_{s=1}^{m} \gamma_{ks} d_{shij} x_{kij} + \sum_{s=1}^{m} U_{sj} d_{shij} + \sum_{s=1}^{m} R_{sij} d_{shij} \qquad \textbf{4.9}$$

In Model 4.9, all variables – including the constant – are multiplied by the dummy variables. Multivariate multilevel models will be used in the current study in order to investigate if schools are consistently effective across different types of students and different outcomes.

4.4.5. NON-LINEAR HIERARCHICAL MODELS

The models that have been discussed so far are linear ones. However, in the case that the outcome variable Y is not continuous, non-linear models have to be used for the statistical analysis of the data. This is because the discrete outcomes do not satisfy the assumptions of the linear models, as they usually have restricted range and their variance is related to their mean.

In the current study, it was found that 2,232 students (7.3%) did not succeed in *lyceum* certificate. Technically, students failed either because they were given 'nought' in some of the examined subjects or because their mean score was lower than the base line *i.e.* 9.5. The cases with 'nought' were not included in any statistical analysis. The cases, however, that achieved a mark between 0.01 and 9.49 were included both in the linear models and the non-linear ones. For the non-linear models, a dichotomous variable was created, in which 'success' was coded '1' and failure was coded '0'. The same coding pattern was used for students' responses in the social domain. More specifically, the

ordered categories in four questionnaire items were reduced to 2 dichotomous outcomes: the 'satisfaction' and the 'dissatisfaction' category. In these items, 'satisfaction' was coded '1' and 'dissatisfaction' was coded '0'. In the next paragraphs there will be a brief presentation of the non-linear hierarchical models.

Let Y be a dichotomous variable that has probability p for outcome '1' and probability (1-p) for outcome '0'. In this case, the mean of the binomial distribution is p and the variance is $p(1-p)$. According to Snijders & Bosker (1999) the logic of the hierarchical logistic models is that in the familiar case that we have students nested in schools, the binary outcome for student i in school j can be expressed as the sum of probability of that outcome for school j (P_j), plus some student-depended residual R_{ij}. This is expressed by Snijders & Bosker (1999: 208) as:

$$Y_{ij} = P_j + R_{ij}. \qquad \textbf{4.10}$$

According to Snijders & Bosker (1999: 209), the variance of the residual term R_{ij}, given the value of the probability P_j, is:

$$\text{var}(R_{ij}) = P_j(1 - P_j). \qquad \textbf{4.11}$$

The authors explain that in case that the observed binary outcome is explained from r explanatory variables (X_1 to X_r), some of which are at the student-level, it can be shown that the probability of success depends also on the individual as well as on the school. In this case, probability P_j takes also the subscript i and 4.10 is written as $Y_{ij} = P_{ij} + R_{ij}$ (Snijders & Bosker, 1999: 208).

According to the statistical theory, the main difficulty in modelling probability is that it is restricted to the domain between 0 to 1 and as Snijders & Bosker (1999) inform their readers 'the linear effect for a possible explanatory variable could take the fitted value outside this interval' (p. 211). Snijders & Bosker (1999) and Agresti (1996) describe how statisticians have overcome this problem by replacing the probability of an outcome by the *odds*, *i.e.* the probability of success to the probability of failure: $\frac{p}{1-p}$.

Snijders & Bosker (1999) write that the advantage of odds is that with proper transformation they can take any real value. In the present study, the transformation of the odds was the *logistic* or *logit link*. The formula of logit link is '$\text{logit}(p) = \ln(p/1-p)$', where ln($x$) denotes the natural logarithm of number x. In the statistical literature, models that are based on the logit link are called 'logistic regression

models'. In logistic regression analysis, linear models are constructed for the log-odds of the probability.

In the present study the log-odds of probability of success in *lyceum* certificate could be considered to be normally distributed in the population of schools. According to Snijders & Bosker (1999: 213), this could be written as:

$$\text{logit}(P_j) = \gamma_0 + U_{0j}\,. \qquad \textbf{4.12}$$

The authors (*op. cit.*) explain that in Model 4.12, U_{0j} are independent deviations at school level, distributed normally with mean 0 and variance τ_0^2. Student-level variance is not included in Model 4.12 as this variance can be derived from 4.10 (*op. cit.*). Snijders & Bosker (1999: 213) explain that if the probability of success corresponding to the average value γ_0, is denoted π_0, it can be written that:

$$\pi_0 = \text{logistic}(\gamma_0) = \frac{e^{\gamma_0}}{1+e^{\gamma_0}}, \qquad \textbf{4.13}$$

where e is the base of the natural logarithm. The π_0 approximates the average value of the probability of success in the population of schools (see Goldstein, 1995c for a discussion). Snijders & Bosker (1999: 214) present a formula for the calculation of the variation in P_j, when τ_0^2 is small:

$$\text{var}(P_j) \approx [\pi_0(1-\pi_0)]^2\,\tau_0^2 \qquad \textbf{4.14}$$

Snijders & Bosker (1999: 216) also explain that in the case that a number of explanatory variables X_1 to X_r are considered to explain the probability of success, it can be written that[1]:

$$\text{logit}(P_{ij}) = \gamma_0 + \sum_{h=1}^{r} \gamma_h x_{hij} + U_{0j}\,. \qquad \textbf{4.15}$$

In that case, a unit difference in X_h between two students in the same school is associated with a difference of γ_h in the log-odds of their possibility for success (*op. cit.*). Finally, Snijders & Bosker (1999) explain given the values of all the explanatory variables, deviations U_{0j} are assumed to have zero mean and a variance τ_0^2. Level-one residual is not included in Equation 4.15 because, as the authors explain (*op.cit.*) this equation refers to the probability P_{ij} and not to the outcome Y_{ij}. In the current study

non linear hierarchical models will be employed for the analysis of binary school outcomes at the academic and affective domain.

4.4.6. CONCLUSIONS

This chapter focused on the research design of the current study. In the first sections it was argued that the notion of 'reality' is something that cannot easily be dismissed in social and educational research. Some researchers have mistakenly concluded that, since 'naïve realism' is unacceptable, one is obliged to adopt the constructivist paradigm in which the notion of 'reality' is dispensed with along with 'naïve realism'. It is true that in the past many people have wrongly believed that reality is not mediated by researchers' language or world of ideas. However, in the current researcher's view, the adherents of radical constructivism are equally wrong to accept the idea that multiple realities of equal weight exist. Later, the current researcher discussed the characteristic of a 'good' school effectiveness study. It was argued that when value added analyses are impossible, other explanatory variables can be used in statistical models for making fairer comparisons between schools. It was explained that though students' previous achievement was available in the current study, a true value added analysis was not possible.

There are four samples in the current work, each one with its own characteristics. It was shown that all samples are broadly representative of the population in terms of selected measures. A problem that had to be solved concerned the finding that the distributions of students' grades were not normal. Instead, they were skewed towards the higher grades. This phenomenon is known in Greece as the 'overproduction of excellency'. In Section 4.3.6 the author presented the rationale and the method for normalisation of students' examination results. Section 4.3.7 dealt with the description of school processes and affective school outcomes. A number of variables in the current study were not observed directly but were constructed by means of a procedure known as Exploratory Factor Analysis. Five teacher and four student Factors were identified in this work. The current author presented some special issues in Factor Analysis in order to explain special methodological steps in the thesis. Finally, the current researcher presented the basic idea and the statistical notation of simple and more complex

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[1] Note that the coefficients have single subscripts for simplicity reasons

hierarchical linear models. In the next chapter such models will be fitted into real data for the *lyceia* in Attiki and their students.

5. FINDINGS: EXPLORING VARIABLES IN SCHOOL EFFECTS IN RELATION TO STUDENTS' ACADEMIC AND AFFECTIVE OUTCOMES

"What can schools do to achieve the desired effect? Studies such as PISA can answer this question only up to a point, because many important contextual factors cannot be captured by international comparative surveys of student performance and because such surveys do not look closely enough at processes over time to allow cause and effect to be firmly established".

OECD (2001) Knowledge and Skills for Life (First Results from the OECD Programme for International Student Assessment (PISA) 2000. Paris: OECD.

5.1. DESCRIPTIVE STATISTICS: THE INTERPRETATION OF SCHOOL OUTCOMES AND PROCESSES

5.1.1. INTRODUCTION

This chapter contains the main findings of the current study. Section 5.1 examines the meaning of school outcomes, processes factors and presents descriptive statistics for a selection of variables. Most of these variables have been measured at nominal level, like students' gender. There are, however, variables that have been measured at ordinal level, like students' and teachers' opinions. Finally, there are variables that have been measured with interval or ratio scales, like students' normalised scores in the national examinations. Most of the variables relating to social and affective outcomes as well as school processes are based on students' and teachers' views. Students' views are used to provide measures of social and affective outcomes, whereas teachers' responses are used to provide measures of school processes. The following 13 sections contain the most interesting descriptive statistics of the current study.

5.1.2. STUDENT AGE

Age is a factor strongly associated with achievement, especially in the early years of schooling. In an article which appeared in the journal *Educational Research*, West & Varlaam (1990) asked if the age at which children start school had any impact on their achievement. The researchers reviewed the literature and concluded that it was rather the quality of pre-school provision and not so much the age of entrance which was important for later achievement. It is interesting for the Greek context to investigate whether age of entrance continues to affect achievement after 12 years of schooling. In the current study, students' ages were measured with the help of a categorical variable with three ordered categories: 'born before 1982', 'born in 1982', and 'born after 1982'. This was decided because only year of birth and not month was available in the Ministry of Education database for the students of the 357 integrated *lyceia* in Attiki prefecture. The base category in the multilevel models was 'born in 1982'. The percentages of the three categories are presented in Table 5.1.

Table 5.1. Students' year of birth (percentages).

Year of birth	Population (375 schools)	Sample A (39 schools)	Sample B (39 schools)	Sample C (33 schools)	Pilot study (11 schools)
Before 1982	4.43	4.0	3.1	3.2	7.9
In 1982	74.66	74.8	75.6	75.1	75.0
In 1983	20.92	21.0	21.3	21.6	17.1

Note: Some percentages do not add up to 100% due to rounding.

As can be seen in Table 5.1, most of the students were born in 1982. These students started school at the age of six and were 17 years old when they completed the questionnaire (January – February of 2000). There is however a significant percentage of students who were born in 1983. In the pilot study, the students who were born in 1983 were 106 (or 17%). Their dispersion to the 11 schools of the pilot study was found to be random ($\chi^2_{d.f.=10} = 8.27, p = 0.6$). In the main study – the population and the three samples – the percentage of students who were born in 1983 was around 21%. According to normal practice in the 1980s, the children who were born in the first six months of a given year could register at school as if they had been born in the previous year. For example, children who were born in April 1983 were in the same year cohort with the children who were born in June 1982. The current researcher expected that 'early starters' underachieve in the final examinations in June of 2000. Thus, the multilevel models that will be presented in Section 5.2 investigate whether those who were born in 1983 have managed to bridge the gap of achievement.

Another 4.5% of the students of the population were born between 1978 and 1981. An explanation of this may be that some students may have repeated one or more school years or that they are sons and daughters of refugees who are immigrants to Greece after the recent geopolitical changes in the Balkans and the former Soviet Union. The Greek educational system has for years been serving a mono-cultural society and is now struggling to deal with the fact that students of many different cultural backgrounds may be attending in the same classroom. Until recently students who come from other countries had been placed in grades lower than those attending in their country of origin. It is interesting, therefore, to investigate whether the performance of older students differs from those of typical age. It must be noted that no measure of ethnic origin or refugee status was available for the students in the population.

5.1.3. DIRECTIONS OF STUDIES

The characteristics of the three Directions of studies (*katefthinseis*) in the integrated *lyceum* were presented in detail in Section 2.3.2. At the time when the pilot study was conducted (1998 – 1999), the most problematic Direction was the Technology one because teaching materials for this Direction were lacking and the laboratories in most of the schools were not organised. The situation improved during the next school year (1999 – 2000) but even then the classes of the Technology Direction were far from being satisfactory. In many cases, students of the Technology Direction took classes in computing from textbooks and without actually having access to computers. In the pilot study only one out of five students opted for the Technology Direction. This ratio is small enough but it could be much smaller if it was not for the students' fear of failing in the other two directions, which are considered more 'difficult'. The inconsistency between pilot study and the population as regards the percentage of students who attended the Technology Direction was reduced in the main study. The percentages of the students in the three Directions of studies are presented in Table 5.2 (see also Table 4.9 in page 194).

Table 5.2. Percentages of the students in the three Directions of studies.

Programme of studies (Direction)	Population (375 schools)	Sample A (39 schools)	Sample B (39 schools)	Sample C (33 schools)	Pilot study (11 schools)
Humanities	38.19	39.4	40.7	39.8	38.8
Sciences	31.92	29.2	28.7	28.4	42.5
Technology	29.89	31.4	30.6	31.9	18.7

5.1.4. STUDENT GENDER

Many studies have demonstrated that girls attain lower grades than boys in subjects like Science or Mathematics (see, for example, the first results from PISA 2000, edited by OECD 2001). It is therefore interesting to investigate whether this applies also to the Greek educational system. There was an over-representation of girls in the pilot study in which the boys to girls ratio was 256:355. The corresponding percentages were 42% for the boys and 58% for the girls. Statistics regarding the boys to girls ratio on entering

lyceum are not available but if one suggested a hypothetical ratio for boys and girls to be 50:50, the difference between boys and girls in the pilot study was statistically significant ($\chi^2_{d.f.=1} = 16.04$, $p< 0.01$). A similar hypothetical over-representation of girls was observed in the population of the *lyceia*, in the main study: 54% girls and 46% boys.

An explanation for this 'over-representation' of girls may be that boys either leave school after finishing *gymnasio* (the compulsory lower secondary school) or that more boys than girls continued in secondary vocational schools, the *technologica ekpaideftiria*. Whatever the reasons may be, the over-representation of girls in the integrated *lyceum* is an indicator of different academic pathways for the two sexes. This issue needs to be investigated longitudinally. As far as the current study is concerned, different pathways of educational achievement between boys and girls will be analysed in Section 5.4.2. One simple descriptive statistic that will be noted in the current section is the difference in the percentages of participation of boys and girls in the three Directions. In Table 5.4 it is shown that girls opted for the Humanities Direction whereas more boys preferred the Sciences and Technology Directions.

Table 5.3. Participation of boys and girls in the three Directions (375 schools).

		Direction of studies			
		Humanities	**Sciences**	**Technology**	**Total**
Gender	**Boys**	2,550	5,359	6,160	14,069
		(8.3)	(17.5)	(20.1)	(46)
	Girls	9126	4401	2977	16,504
		(29.8)	(14.4)	(9.7)	(54)
	Total	11,676	9,760	9,137	30,573
		(38.2)	(31.9)	(29.9)	(100)

Note: the numbers in the parentheses are percentages.

A similar method of comparison between boys and girls has been used by Bosker & Dekkers (1994), who in their paper 'School differences in producing gender-related subject choices' showed that schools varied in the difference between the numbers of girls and boys choosing Mathematics.

5.1.5. STUDENT MOBILITY

A number of studies in England have shown that students' mobility affects their achievement in a negative manner (Sammons, 1996). The effect of mobility on achievement is such that in England the Office for Standards in Education has published special guidelines for measuring students' mobility OFSTED (1994). In addition, statisticians in the London Institute of Education have developed special algorithms for allowing multiple previous school membership to be modelled (Rasbash & Goldstein, 1994). In the pilot study, three measures of students' mobility were used: (a) whether students attended the same *lyceum* in 1998 – 1999 school year, (b) the name of the lower secondary school (*gymnasio*) that they attended, and (c) the name of the primary school that they attended. In the pilot study it was also found that only 9% of the students had attended a different *lyceum* in previous years and that these students were randomly scattered in the 11 schools of the sample ($\chi^2_{d.f.=10}=6.94$, $p=0.7$). In the main study (Sample B), 305 students (25.4%) attended different *lyceum* in year 2. The name of the primary school was not asked. Both in the pilot and the main study, it was found that having attended a different *lyceum* in the previous year did not show any statistically significant difference either in academic achievement or in other school outcomes.

As regards previous multiple school membership, it was found in the pilot study that students attended 57 different *gymnasia* (lower secondary schools) before enrolling in the 11 *lyceia* of the sample. Most of the students (86.4%) attended 14 *gymnasia*, roughly the number of *lyceia* in the pilot study. This was not unexpected because in Greece *gymnasia* share the same buildings with *lyceia*. Normally, therefore, students do not physically change their school building when they continue in *lyceum* after *gymnasio*. As regards the primary schools, it was found that in the pilot study 68 per cent of the students attended 30 different primary schools. The total number of primary schools attended by students in the sample of the pilot work was 163. In conclusion, it was found that students' mobility was not a significant factor in accounting for variation in the attainment of other educational outcomes. This finding might be expected because in Greece, there is no open enrolment policy and all students attend the school that happens to be nearest to their house.

5.1.6. STUDENT SOCIO-ECONOMIC STATUS

The role of parents' socio-economic status was explored in Section 4.3.3. In the questionnaire of the main study, 11 numbered 'cards' were printed, each one with different categories of trades and professions. Each card included a general description of similar occupations and some examples. The basis for the construction of the 11 occupation cards was a recent publication about social class and social mobility in Ireland (Breen & Whelan, 1996: 21). The reason for using this publication was explained in Section 4.3.3. The numbers in the cards were not arranged according to the status of the professions in them. For example, teachers were included in the card numbered '1', whereas the 'unemployed' (including 'inactive') were put in the card number '3'. Students were initially asked to write in special places in the questionnaires the number of the card that represented the occupation of their parents. The students were then asked to describe their parents' occupation in their own words. This procedure proved to be very useful in the preparation of the database because the numbers were compared with the written descriptions. From these comparisons it was found that the use of the numbered cards provided a reliable method for identifying parents' occupations. As regards parents' educational level, exactly the same procedure was followed but this time with eight numbered cards. Each card described an educational level. The occupation and the educational level of the parents are presented in Table 5.4 and Table 5.5 respectively. The numbers in the parentheses are percentages.

Table 5.4. Father's and mother's occupation (Sample B).

	1. Lower-grade professionals, administrators and officials, in education, police, etc	2. Managers in small industrial establishments (state or private), supervisor of non-manual employers	3. Unemployed or inactive	4. Agricultural and other workers in primary production	5. Semiskilled manual workers (not in primary production	6. Skilled manual workers
Father's occupation	302 (25.2)	106 (8.8)	79 (6.6)	7 (0.6)	58 (4.8)	152 (12.7)
Mother's occupation	320 (26.4)	51 (4.2)	592 (48.9)	2 (0.2)	58 (4.8)	53 (4.4

Note: the numbers in the parentheses are percentages.

Fathers' and mothers' occupation (continued).

	7. Technicians, supervisors or other workers or lower-grade technicians	8. Higher-grade professionals or technicians; managers in large industrial establishments	9. Small proprietors, own business self-employed, artisans without employees	10. Small-holders, small proprietors, own business self employed with employees	11. 'Functionary': doctors, university teachers etc
Father's occupation	68 (5.7)	70 (5.8)	241 (20.1)	64 (5.3)	52 (4.3)
Mother's occupation	10 (0.8)	13 (1.1)	64 (5.3)	16 (1.3)	32 (2.6)

Note: the numbers in the parentheses are percentages.

Looking at Table 5.4, it is clear that almost half of the mothers are inactive (most probably housewives). The next most frequent occupation among women was 'lower-grade professionals, administrators and officials' (card 1). The same occupation was also most frequent among men. This finding is very likely to reflect the fact that Greece has had a hypertrophied state sector and most of the white-collar workers in the prefecture of Attiki are civil servants. As regards parents' education, the most frequent level is the certificate of *lyceum*.

Table 5.5 presents parents' educational level by gender for the students of Sample B. Apart from direct comparisons between the educational level of the two parents, the cells of Table 5.5 can be compared with the educational attainment as seen in the cells of Table 2.3. In Table 2.3, the percentage of Greeks who are between 35 and 44 years of age and have at least a degree from upper secondary school is 59% for the men and 57% for the women. The corresponding percentages in Table 5.5 are 66.5% for the men and 68.8% for the women. The percentages of Greek men and women in the same age group who have at least a degree from the tertiary level are 24% and 18% per cent respectively. The equivalent figures in Table 5.5 are 40.4% and 30.1% respectively. Thus the parents of the students in Sample B appear have on average a relatively higher level of educational attainment from the mean attainment of all the Greek parents. This might be a reflection of the fact that the population in Attiki is not representative of the population of the whole country.

Table 5.5. Father's and mother's educational level (Sample B).

	1. Some years in the primary school	2. Primary school	3. Some years in the secondary school	4. Secondary school
Father's education	62 (5.2)	156 (13.0)	181 (15.1)	313 (26.1)
Mother's education	51 (4.2)	163 (13.5)	162 (13.4)	467 (38.7)
	5. Polytechnic	6. University	7. Postgraduate studies	8. Degree in Music
Father's education	227 (18.9)	235 (19.6)	23 (1.9)	1 (0.1)
Mother's education	171 (14.2)	182 (15.1)	10 (0.8)	1 (0.1)

Note: the numbers in the parentheses are percentages.

5.1.7. *FRONTISTERIA* AND PRIVATE TUITION

One of the most important indicators of the effectiveness of the Greek educational system is the existence of *frontisteria* (the evening cramming schools) and the money which parents pay for their children to receive private lessons. As Dretakis (2001), an academic and former socialist Minister, wrote in the quality newspaper *I Kathimerini*, 'the biggest problem of education in our country is *parapaedeia* (the parallel education system)'. The ways in which *frontisteria* and private tuition constitute a 'parallel' form of education in Greece – that is what '*parapaedeia*' means – were discussed in Section 2.1. As *parapaedeia* is a covert activity from an economic and cultural point of view (no receipts are issued and no open discussions are held), there are no published studies investigating either its extent or its impact on students' learning. In the pilot study, 70.5% of the students attended a *frontisterion*. When the students were asked to write the name of the *frontisterion* they attended, 23% of them chose not to answer, probably because they found the question too personal. Nevertheless, the names of 80 different *frontisteria* were selected. The names of *frontisteria* are interesting from a semantic point of view. Most have come from mathematics, physics or biology like 'eccentric', 'buoyancy', and 'cell'. Other *frontisteria* have names indicating the structured teaching methods: *'Methodiko'* (having a structured teaching method) or *'Praxis kai Praxeis'*

(reflective action and mathematical operations). Some other *frontisteria* have names that indicate their area of specialisation in terms of tertiary education, like *'Nomiko'* ('juridical', for the students who aim at the Law Schools) or *'Stratiotiko'* ('military', for those students who aim at the Military Academy). Finally, there are *frontisteria* that are named after the person who runs them.

In the main study the students were not asked to give the names of their *frontisteria* because this number was expected to be very large. In Sample B, 78.5% of students attended *frontisteria* whilst only a minority of students received private tuition (30%). Some students employed a combination of *frontisterion* and private tuition. These cases represented 18.4% of the total number of students. Only 9.8% of the students of Sample B employed neither of the two forms of *parapaedeia* (*i.e.* neither *frontisterion* nor private tuition). Simple statistics showing us of *frontisterion* and private tuition are presented in the following table. This is the first time that such statistics have been published.

Table 5.6. *Frontisterion* and private tuition.

	Frontisterion		
Home tuition	Not Employing	Employing	Total
Not Employing	120	737	857
Per cent within 'home tuition'	(14.0)	(86.0)	(100.0)
Per cent within '*frontisterion*'	(45.6)	(76.6)	(70.0)
Per cent of Total	(9.8)	(60.2)	(70.0)
Employing	143	225	368
Per cent within 'home tuition'	(38.9)	(61.1)	(100.0)
Per cent within '*frontisterion*'	(54.4)	(23.4)	(30.0)
Per cent of Total	(11.7)	(18.4)	(30.0)
Total	263	(962)	1,225
Per cent within 'home tuition'	(21.5)	(78.5)	
Per cent within '*frontisterion*'	(100.0)	(100.0)	
Per cent of Total	(21.5)	(78.5)	

5.1.8. ACCOMMODATION

The students of Sample B were asked to state if they lived in an owned or a rented house and whether there was a room in their house where they could do their homework without being disturbed. The results are presented in Table 5.7.

Table 5.7. Students' accommodation (Sample B).

			Study room at home		
			No	Yes	Total
Type of Housing	Rent	count	72	173	245
		per cent	(5.9)	(14.1)	(20.0)
	Owners	count	175	805	980
		per cent	(14.3)	(65.7)	(80.0)
	Total	count	247	978	1225
		per cent	(20.2)	(79.8)	(100.0)

Living in an owned house is an indication of a family's socio-economic status. Having a study room at home may also be seen as an essential factor for success in school. Eighty percent of the students stated that their families owned the house they lived in. Similarly 79.8% of the students stated that there was a room in their house where they could study without being disturbed.

5.1.9. COMPUTER AT HOME

Access to a computer and the Internet could be seen as a factor related with academic achievement. In Greece, very few schools have computers for students to use. The only computer in Greek *lyceia* is usually located in the director's office and it is used by one or two experienced teachers for administrative purposes. The main function of computers in the Greek *lyceia* (particularly no computers exist at primary and lower secondary level) is either to print out the special guidelines that are issued from the upper educational levels (on CD-ROMs) or to make data bases with the names and grades of students. Of course, many Greek *lyceia* have access to the Internet. There are also many *lyceia* with their own web-page on the World Wide Web. However, this notable fact does not mean that the students of these *lyceia* have organised access to the 'information highway'. Usually only a small circle of teachers and students has the privilege to using these machines.

As in many other cases, Greece has not gathered any statistical data for Greek students and their access to computers at home. The current study showed that the percentage of *lyceum* students who have access to a computer in their homes is 48.5 with a standard

error of 1.43 (Sample B). This figure is very near to the unweighted average of the OECD countries that for the year 1998 was 40 per cent (see OECD-CERI, 2001: 149). The OECD unweighted average for students per computer in upper secondary education is 13 per cent. In the current study, none of the schools of Sample B had had any organised access to computers for their students.

5.1.10. SOCIO-ECONOMIC STATUS, *PARAPAEDEIA* AND ACCESS TO COMPUTER

As claimed by the current author in Section 2.1.3, the Greek shadow education system of *parapaedeia* is associated with family's socio-economic status. However, no studies have been carried out to investigate this hypothetical association. The present study offers some evidence for the statistical significance and the strength of the association between father's occupation and mother educational level from the one hand and *frontisterio* attendance, *idiaitero*, and access to computer from the other.

In order to test the hypothesis that father's occupation is independent from attending *frontisterio*, taking *idiaitero* or having access to a computer at home, the current researcher constructed two-way contingency tables and used the *chi square* test of independence (Likelihood Ratio) with 9 degrees of freedom. In addition, Cramer's V coefficient was used for measuring the strength of the association. Table 5.8 represents three two-way contingency tables. The fourth occupational category ('agricultural and other workers in primary production') is missing from Table 5.8 because the expected values for independence for this category were too small for the chi square distribution to be continuous. With the remaining 11 categories it was found that *frontisterion* attendance is not associated with father's occupation. The chi square test for *frontisterion* was $\chi^2 = 8.535$ (p = 0.481) and the associated Cramer's V coefficient was 0.092 (p = 0.507). However taking *idiaiteron* and having a computer in home are two variables that if taken separately are highly associated with father's occupation. For *idiaiteron* the value of chi square was $\chi^2 = 46.811$ (p = 0.000) and for 'computer' the chi square was $\chi^2 = 38.577$ (p=0.000). The strength of the statistically significant associations which were described above was relatively small. Cramer's V coefficient between father's occupation and *idiaiteron* was 0.224 (p = 0.000). The corresponding coefficient between father's occupation and 'computer' was only 0.196 (p = 0.000).

Table 5.8.Father's occupation by *parapaedeia* and access to computer.

	1. Lower-grade professional, administrators and officials, in education, police, etc		2. Manager in small industrial establishments (state or private), supervisor of non-manual employers		3. Unemployed or inactive		5. Semiskilled manual worker (not in primary production		6. Skilled manual worker	
	No	Yes	No	Yes	No	Yes	No	Yes	No	Yes
Frontisterio	47 (0.3)	192 (-0.3)	16 (-0.9)	87 (0.9)	8 (-1.3)	55 (1.3)	9 (0.9)	28 (-0.9)	28 (1.0)	99 (-1.0)
Idiaitero	**161 (-0.3)**	**78 (0.3)**	64 (-1.4)	39 (1.4)	48 (1.4)	15 (-1.4)	27 (0.6)	10 (-0.6)	**99 (2.5)**	**28 (-2.5)**
Computer	123 (1.4)	116 (-1.4)	**37 (-2.5)**	**66 (2.5)**	33 (0.8)	30 (-0.8)	17 (-0.2)	20 (0.2)	**70 (1.9)**	**57 (-1.9)**

	7. Technician, supervisors or other workers or lower-grade technician		8. Higher-grade professional or technicians; managers in large industrial establishments		9. Small proprietor, own business self-employed, artisan without employees		10. Small-holder, small proprietor, own business self employed with employees		11. 'Functionary': doctors, university teacher etc	
	No	Yes	No	Yes	No	Yes	No	Yes	No	Yes
Frontisterio	10 (-0.5)	50 (0.5)	12 (0.3)	47 (-0.3)	38 (1.0)	159 (-1.0)	5 (-1.5)	42 (1.5)	11 (1.4)	29 (-1.4)
Idiaitero	47 (1.7)	13 (-1.7)	**29 (-3.2)**	**30 (3.2)**	145 (1.8)	52 (-1.8)	30 (-0.7)	17 (0.7)	**13 (-5.0)**	**27 (5.0)**
Computer	22 (-1.7)	38 (1.7)	22 (-1.6)	37 (1.6)	**112 (3.0)**	**85 (-3.0)**	17 (-1.6)	30 (1.6)	**8 (-3.5)**	**32 (3.5)**

Note: the numbers in the parentheses are adjusted residuals.

In Table 5.8 dichotomous variables ('yes' or 'no') are seen in relation to father's occupation. The numbers above the parentheses in the cells are the observed cases of students. The numbers in the parentheses are the adjusted residuals for these cells (for an explanation of adjusted residuals see Appendix on page 357). Cell with values in bold are those with adjusted residuals larger than 2 in absolute value. These cells are of particular interest because they make a large contribution to the final value of the chi square test.

Just like the case of father's occupation, Likelihood Ratio chi square test (with 5 degrees of freedom) and Cramer's V coefficient of association have been used for testing the hypothesis that mother's educational level is independent from *frontisterio* attendance, *idiaitero* classes and access to computer at home. It was found that attending *frontisterio*, taking *idiaitero* and having access to a computer at home are three variables that if seen separately are not independent from the educational level of the mother. Table 5.9 presents the observed frequencies and adjusted residuals of three two-way contingency tables. Adjusted residuals larger than 2 in absolute value have been printed in bold. The categories 'post-graduate studies' and 'degree in Music' are missing from Table 5.9 because their expected values are small for the chi square distribution to be continuous.

Table 5.9. Mother's educational level by *parapaedeia* and computer.

	1. Some years in the primary school		2. Primary school		3. Some years in the secondary school	
	No	Yes	No	Yes	No	Yes
Frontisterio	11 (1.4)	29 (-1.4)	**13** **(-2.7)**	**114** **(2.7)**	28 (1.7)	85 (-1.7)
Idiaitero	28 (0.2)	12 (-0.2)	**106** **(3.8)**	**21** **(-3.8)**	**90** **(2.7)**	**23** **(-2.7)**
Computer	**26** **(2.2)**	**14** **(-2.2)**	**81** **(3.9)**	**46** **(-3.9)**	62 (1.6)	51 (-1.6)
	4. Secondary school		5. Polytechnic		6. University	
	No	Yes	No	Yes	No	Yes
Frontisterio	72 (-0.2)	318 (0.2)	23 (-1.1)	124 (1.1)	36 (1.5)	120 (-1.5)
Idiaitero	259 (-1.3)	131 (1.3)	98 (-0.6)	49 (0.6)	88 (-3.6)	68 (3.6)
Computer	181 (-0.7)	209 (0.7)	67 (-0.6)	80 (0.6)	**48** **(-4.6)**	**108** **(4.6)**

Note: the numbers in the parentheses are adjusted residuals.

The association of the categorical variables in Table 5.9 can be described as follows:

Two-way contingency table	Chi square (Likelihood Ratio with 5 d.f.)	Cramer's V coefficient
Mother's education by *frontisterio*	χ^2 =14.115 (p = 0.015)	0.118 (p = 0.018)
Mother's education by *idiaitero*	χ^2 = 32.889 (p = 0.000)	0.180 (p = 0.000)
Mother's education by computer at home	χ^2 =39.445 (p = 0.000)	0.200 (p = 0.000)

The conclusions from the current section is that with the exemption of *frontisterion* father's occupation and mother's educational level are not independent from students' learning opportunities outside school. These opportunities are expressed either as (a) attending *frontisterio*, or (b) taking *idiaitero* classes, or (c) having access to a computer at home. Moreover, basic investigation of the adjusted residuals in the cells of the relative two-way contingency tables shows that *idiaitero* lessons and computer at home are offered mainly to students who have fathers with prestigious jobs and mothers with a university degree. However, the strength of the relevant associations between the categorical variables was in every case small (around 0.2).

5.1.11. COMMUTING TO SCHOOL

Students of Sample B were asked to state if they used any means of transport in order to go to school every morning. It was found that around one out of five students (20.6%) commuted to their schools during 1999 – 2000. The rationale of this question is evident for someone who has knowledge of the problematic situation of public transport in Athens. The capital of Greece is a city with some of the heaviest traffic in Europe. According to Dinopoulos (1999) only 30% of the commuters use a form of public transport. Athens' new underground train system was inaugurated in February of 2000 but most Athenians go to their work either by private means of transport (cars and motorcycles) or taxis. Taxis in Athens are free from any state control. Their exact number is unknown because no archive is kept. According to a recent report from Carassave (2001) for *Time* magazine, 'many taxi drivers in Athens don't smile, refuse to issue receipts and negotiate fares upon entry'. If students have to commute in these

conditions every morning, it would be interesting to see the effect of the variable 'commuting to school' on their achievement.

5.1.12. Academic outcomes: Overproduction of 'excellent' students

The current study investigated the academic outcomes of the students of Attiki prefecture in 27 nationally examined subjects. Some interesting descriptive statistics of students' raw scores in the examinations of the year 2000 are presented in Table 5.10.

Table 5.10. Descriptive statistics for 27 examined subjects (375 schools).

	M	Mean	Std Dev.	Median	Mode	Percentiles					
						0	25	50	75	95	99
Mean in year 2	28,291	13.4	(2.8)	12.9	11.0	9.8	11.1	12.9	15.7	18.3	19.2
Lyceum Certificate	28,723	14.8	(2.9)	14.9	17.7	10.2	12.4	14.9	17.3	19.1	19.5
General Education											
Orthodox Religion	28,497	16.5	(2.5)	16.9	18.8	12.0	14.7	16.9	18.6	19.7	20.0
Greek Language	28,707	13.8	(2.5)	13.9	14.1	9.7	12.0	13.9	15.7	17.7	18.7
History	28,716	14.2	(3.7)	14.7	19.0	7.7	11.5	14.7	17.3	19.2	19.7
Science	28,721	15.4	(3.6)	16.0	20.0	8.8	12.9	16.0	18.5	19.9	20.0
Biology	28,719	16.3	(2.8)	16.8	20.0	11.4	14.3	16.8	18.7	19.8	20.0
Epistemology	28,721	16.8	(2.7)	17.6	19.8	11.4	15.3	17.6	19.0	19.8	20.0
Mathematics & Statistics	28,656	14.5	(4.1)	15.0	20.0	7.3	11.4	15.0	18.2	19.8	20.0
Sciences Direction											
Biology	9,410	15.5	(3.6)	16.5	18.9	8.8	13	16.5	18.6	19.7	20.0
Mathematics	9,413	13.3	(5.1)	14.2	20.0	5.0	8.6	14.2	18.1	19.8	20.0
Physics	9,413	14.3	(4.6)	15.4	20.0	6.2	10.6	15.4	18.4	19.8	20.0
Chemistry	9,382	14.9	(4.5)	16.3	20.0	6.8	11.1	16.3	19.0	19.9	20
Humanities Direction											
Ancient Greek	10,901	12.9	(3.7)	13.2	11.5	6.5	10.3	13.2	15.8	18.3	19.1
Latin	10,905	13.2	(4.9)	13.8	18.8	4.1	9.6	13.8	17.5	19.5	19.9
Philosophy	10,905	16.1	(2.6)	16.6	18.8	11.3	14.4	16.6	18.3	19.4	19.8
Modern Greek Lit.	10,900	14.7	(2.9)	15.1	15.5	9.5	12.7	15.1	17.1	18.8	19.5
History	10,833	13.6	(3.8)	13.8	15.5	7.3	10.6	13.8	16.9	19.0	19.6

Descriptive statistics for 27 examined subjects (375 schools).

	N	Mean	Std Dev.	Me-dian	Mode	Percentiles					
						0	25	50	75	95	99
Technology Direction I											
Mathematics	8,135	9.6	(5.0)	8.7	6.5	2.9	5.3	8.7	13.6	18.5	19.6
Physics	8,138	9.7	(4.4)	8.5	6.5	4.2	6.2	8.5	12.8	18.3	19.6
Management Studies	8,148	14.2	(2.9)	14.1	14.3	9.8	12.1	14.1	16.3	18.8	19.7
Information Systems	7,947	14.8	(3.2)	15.0	20.0	9.3	12.5	15.0	17.3	19.4	20.0
Software Development	7,706	14.7	(3.0)	14.8	14.3	9.9	12.7	14.8	17.0	19.1	19.8
Economics	9,753	15.5	(3.5)	16.3	19.5	8.9	13.2	16.3	18.4	19.7	20.0
Technology Direct. II											
Electrical Engineering	269	16.3	(3.0)	16.8	19.7	10.9	14.4	16.8	18.6	19.9	20.0
Mathematics	269	12.5	(5.5)	13.6	18.9	3.3	7.7	13.6	17.8	19.5	19.9
Physics	268	12.8	(5.2)	13.5	18.6	4.7	8.5	13.5	18.0	19.7	20.0
Chemistry & Biology	267	14.7	(4.0)	15.3	18.8	7.1	11.7	15.3	18.2	19.7	20.0
Technology & Develp.	327	15.6	(3.5)	16.6	18.9	8.7	13.5	16.6	18.3	19.5	19.8

By examining Table 5.10, it can be concluded that the kurtosis in the distributions of students' raw scores is negative. The distributions are also negatively skewed. As can be seen on the right hand part of Table 5.10, the raw scores of the students are accumulated at the higher points of the grading scales which extend from 1 to 20. The reasons which affected the shape of the distributions as well as the technique that was followed for the transformation of the original scores have been presented in Section 4.3.6. In that section the current researcher had argued that 'one tenth of a grade practically decided who would succeed and who would be left out from a good university department'. This argument can now be seen more clearly. For example, the difference between the 75th and the 95th percentile for Chemistry (Sciences Direction) is only 0.9 points. This means that in the examinations for Chemistry of June 2000 1,976 students (21.1%) were accumulated between grade 19 and 19.9 in Chemistry. In the case of Science of the General Direction, 1,462 students (5.1%) achieved either a grade of 19.9 or 20. This phenomenon, *i.e.* the overproduction of excellence, does not reflect the real abilities of Greek students. The overproduction of excellence is most likely to be an indicator of the relatively poor discriminating power of the national examinations. Proposals on how this situation could be amended will be presented in the sixth chapter of the thesis.

5.1.13. AFFECTIVE OUTCOMES

Greek schools focus exclusively on promoting students' cognitive outcomes, at the expense of other activities in the social and affective domain. Student responses to one open-ended question in the 'confidential student questionnaire' indicate this:

- There is no time left for us to relax in school (school 6, student 220, girl).
- [We need] more understanding on the part of our teachers (school 18, student 544, girl).
- In this school human relations sometimes become so irrational (school 18, student 561, boy).
- I would rather we didn't have to attend two hours of Religion [Eastern Orthodox Catechism] in school every week (school 31, student 952, boy).
- In my school, some teachers are not suitable for the subject they teach. (...) There is no time left for other things besides school (...) for us the grade is the only thing that matters (school 32, student 960, girl).
- Vocational guidance is lacking in this school (school 31, student 961, girl).
- Some teachers look down on students and do not accept their opinions (school 32, student 969, girl).

As was presented in Section 4.3.7 of the current work, outcomes in the affective domain were measured with the help of a student questionnaire. In the left hand column of Table 5.11 there is a brief description of the items (questions) in that questionnaire. The columns in the middle of Table 5.11 on the next page contain numbers of answers to the four ordered categories of each item. The range of the scale is from 1 to 4 and the middle point is 2.5. The last three columns on the right hand side of Table 5.11 present simple statistics for each item: the arithmetic mean, the standard deviation and the median. Some of the items have their scores reversed (*i.e.* 4 has been coded 1, and 2 has been coded 3) to ensure that for each question the most positive response gets the larger score. As can be seen from Table 5.11 students are not happy with the discussions that they have in the classrooms with their teachers and would change school if they had the chance (questions B_16 and B_2 respectively). The school climate appears to be competitive. Students are often offended by other students and are offensive to other students (questions B_27 and B_28 respectively). They also flatter their teachers in order to achieve higher grades (question B_31).

Table 5.11. Descriptive statistics of students' answers (Sample C).

Description of the question in student questionnaire	Category 1	2	3	4	Mean	s. d.	Median
B_10R Helping teachers in their work	38	202	356	395	3.1	(0.9)	3
B_11 The hours in school are interesting	82	671	230	8	2.2	(0.6)	2
B_12 Playing truant	27	312	546	106	2.7	(0.7)	3
B_13R Teachers rewarding	74	285	530	102	2.7	(0.8)	3
B_14R Teachers are ironic	101	249	388	253	2.8	(0.9)	3
B_15 Teachers are friends	329	520	125	17	1.8	(0.7)	2
B_16 Teachers discussing in the class	767	197	22	5	1.3	(0.5)	1
B_17R Teachers helping	46	382	501	62	2.6	(0.7)	3
B_18R Teachers are interested	30	197	562	202	2.9	(0.7)	3
B_19R Teachers give feedback	60	383	457	91	2.6	(0.7)	3
B_1R Liking for the school building	242	324	352	73	2.3	(0.9)	2
B_2 Association with the school	125	291	474	101	2.6	(0.8)	3
B_20R Teachers discriminating	173	522	267	29	2.2	(0.7)	2
B_21R Pleasant classes	76	773	136	6	2.1	(0.5)	2
B_22RInformation about vocational training	347	488	135	21	1.8	(0.7)	2
B_23R Information about minorities	457	367	138	29	1.7	(0.8)	2
B_24R Inf. about sexually transf. diseases	392	347	199	53	1.9	(0.9)	2
B_25R Information about drugs	464	349	141	37	1.7	(0.8)	2
B_26 R Asking other students for help	47	97	344	503	3.3	(0.8)	4
B_27R Being offended by other students	30	92	467	402	3.3	(0.7)	3
B_28R Being offensive to other students	36	52	412	491	3.4	(0.7)	3
B_29R Unwanted subcultures in the schools	242	261	290	198	2.4	(1.1)	2
B_30 Making friends easily	38	171	488	294	3.0	(0.8)	3
B_31R Flattering teachers	14	34	206	737	3.7	(0.6)	4
B_32R The quality of home-school relations	133	273	406	179	2.6	(0.9)	3
B_33R The quality of discussions with parents	49	187	445	310	3.0	(0.8)	3
B_4R Order in the school environment	228	422	304	37	2.2	(0.8)	2
B_5R The condition of the classrooms	265	409	264	53	2.1	(0.9)	2
B_6 Avoiding places in the school	561	295	117	18	1.6	(0.8)	1
B_7 Considered to be good student	83	523	365	20	2.3	(0.7)	2
B_8 Doing all the homework	122	491	330	48	2.3	(0.7)	2
B_9R Answering questions in the class	111	641	223	16	2.1	(0.6)	2

Note: 'R' indicates that the coding of the question has been reversed.

From the 991 students of Sample C who answered question number 12 in Table 5.11, which asks whether they would change their school or not, 125 answered 'yes definitely' and 291 'yes probably' (total 416 students). From those 416 students, 352 stated also the reasons why they would change schools if they were allowed to. A open response question was used for this purpose. Students' responses are presented in Table 5.12. The condition of the school building and the behaviour of the teachers were by far the most important reasons why students would change their schools.

Table 5.12. Reasons for changing school if it was allowed (Sample C).

Reasons	Number of answers
The condition of the school building	110
Lack of resources	47
The behaviour of the teachers	90
The behaviour of other students	23
Having to go to school in the evening hours	2
The condition of the school building and the behaviour of the teachers	54
The behaviour of students and teachers	19
The organisation of the school	7

5.1.14. SCHOOL ORGANISATIONAL CLIMATE AND PROCESSES

As has already been stated in Chapter 4, teachers' views on the organisational climate of their school as well as on a number of school processes and policies were investigated by means of a questionnaire that was administered to 223 teachers from 38 schools (Sample D). In the following table, teachers' answers to the 38 questions of the questionnaire are presented analytically, together with a number of simple statistics *viz.* the arithmetic mean, the standard deviation and the median. By examining Table 5.13, we can see that teachers 'fit in well' with their colleagues and that the amount of unanimity in the teachers' council is high. However, teachers are very dissatisfied with the rewards of the teaching profession – economical and others – and believe that their voice is not being heard in the places where important decisions about education are being taken.

Table 5.13. Descriptive statistics of teachers' answers (Sample D).

	Category								
Description of the items in teacher questionnaire	**-3**	**-2**	**-1**	**1**	**2**	**3**	**Mean**	**s.d.**	**Median**
1. Care for the smooth operation of the school as a whole	10	13	47	65	61	27	0.7	(1.7)	1
2. Agreement among teachers	8	19	50	74	56	16	0.5	(1.6)	1
3. New teachers in the school are acquainted with their duties in an organised way	27	51	53	48	36	8	-0.4	(1.8)	-1
4. The sessions of the schoolteachers' council have produced significant results	26	43	44	68	29	13	-0.2	(1.8)	-1
5. Colleagues provide you with advice you about dealing successfully with the difficulties of the educational work	18	31	57	50	53	14	0.1	(1.8)	1
6. Frequent discussions on educational issues in the staff room	6	19	37	57	65	39	0.9	(1.7)	1
7. The effective operation of the schools is regarded as more important than teachers' personal pursuits	14	41	39	79	27	23	0.2	(1.8)	1
8. Accepting each other	6	22	32	75	60	28	0.8	(1.6)	1
9. Frequent agreement in teachers' council	4	16	30	73	80	20	1.0	(1.5)	1
10. Count on colleagues' support	14	24	39	67	60	19	0.5	(1.7)	1
11. Sharing the same views with colleagues on educational issues	6	26	40	70	59	22	0.6	(1.7)	1
13. Fit in well with colleagues	3	9	20	56	89	46	1.5	(1.4)	2
14. See the school as a big family	19	15	37	75	56	21	0.6	(1.8)	1
15. The director is supportive*	48	26	37	46	46	20	-0.2	(2.1)	1
16. The director keeps teachers informed*	26	27	26	46	55	43	0.6	(2.1)	1
17. The director takes initiatives*	38	23	35	44	47	36	0.2	(2.1)	1
18. The director understands teachers' idiosyncrasies*	30	34	30	39	52	38	0.3	(2.1)	1
19. The director emphasises the rules set by the Ministry*	14	17	34	33	56	69	1.1	(1.9)	2
20. Satisfied with the level of a teacher's salary	110	49	43	19	2		-2.0	(1.3)	-2
21. Satisfied with the other rewards of the teaching profession	66	57	36	30	22	12	-1.1	(1.9)	-2
22. Satisfied with teacher's living standards	67	53	54	39	9	1	-1.3	(1.6)	-2

Note: Question 12 does not exist.

* for these questions the scale is from 15 to 20 and not from –3 to +3.

Descriptive statistics of teachers' answers (Sample D).

Description of the items in teacher questionnaire	Category						Mean	s.d.	Median
	-3	-2	-1	1	2	3			
23. Enjoying teaching this year (1999-2000)	22	22	42	64	46	27	0.4	(1.9)	1
24. Finding teaching to be an exciting job	13	15	26	41	67	61	1.2	(1.8)	2
25. Would rather do other work	81	28	48	25	16	25	-1.0	(2.1)	-1
26. Significant others appreciate respondent's work	11	25	34	66	59	28	0.7	(1.8)	1
27. Provide an ideal type of education	11	20	43	86	45	18	0.5	(1.6)	1
28. Commuting from home to school and vice versa is stressful	72	30	43	23	23	32	-0.7	(2.2)	-1
29. Teachers' opinion is being heard in the centres where educational policy is being designed	131	43	34	11	4	0	-2.2	(1.2)	-3
30. Public opinion understands the difficulties of the teaching profession	84	58	54	21	3	3	-1.7	(1.4)	-2
31. Freedom to choose teaching materials	9	17	51	57	59	30	0.7	(1.7)	1
32. Freedom to choose teaching strategies	14	13	42	78	54	22	0.6	(1.7)	1
33. Keeping the classes well disciplined	4	9	32	74	62	42	1.2	(1.5)	1
34. Freedom to assign the proper amount of homework	5	8	46	66	57	41	1.0	(1.6)	1
35. The students learn easily the things that teachers are trying to teach	3	13	50	97	50	10	0.6	(1.4)	1
36. Students' attitudes and behaviour reduce their chances for success	10	34	64	70	34	11	0.0	(1.6)	1
37. Disorderly student behaviour interferes with the quality of teaching	25	28	55	36	52	27	0.2	(2.0)	1
38. The students lack interest in the subjects that respondent teaches	15	31	71	63	36	7	-0.1	(1.6)	-1

By examining Table 5.13 it can be concluded that most of the teachers who participated in the study believe that their voice is not being heard, their status is low and their monetary and non-monetary rewards inadequate. On the other hand, it seems that the same teachers love the profession and build up good interpersonal relations in their schools.

5.1.15. SCHOOL SIZE

In Section 3.7.2, it was noted that in some studies school size was associated with students' academic achievement. In the current study however, information about the size of the schools was unavailable. Thus, the number of students in each school which participated in the examinations of 2000 was used as a proxy measure for the size of the school. The average number of students who participated in the examinations of June 2000 for the population of 375 *lyceia* was 101.79 students per school with a standard deviation of 48.33. The largest *lyceum* had 326 participants. For the needs of the statistical analysis, a level-2 variable with four categories was constructed. The variable was named 'school size'. The categories of school size are presented in Table 5.14. The reason why a categorical variable and not a continuous one was constructed for variable 'school size' is that the number of students who participated in the examinations of the year 2000 is already a proxy measure of the size of the school. It was thus decided to categorise from the beginning the schools as 'small', 'medium' and 'large'.

Table 5.14. The number of students of each school who participated in the examinations of 2000.

Category	Code in the data base	Number of students in each category	Percentage (%)
Up to 49 students	1	2,535	8.29
50 to 101 students	2	14,878	48.66
102 to 200 students	3	12,293	40.20
201 students and above	4	867	2.83
Total		30,573	100

So far in the current chapter, a number of interesting descriptive statistics have been presented. Some of these statistics have never been published in the past, like, for example, the percentage of Greek students who attend *frontisterion* or the percentage of Greek students who have access to a computer in their homes. The distributions of grades in the public examinations of June 2001 were skewed and this means that the discrimination power of the examinations was small. In the next section, the variables which have been investigated so far will be added to hierarchical linear modes.

5.2. ANSWERING THE FIRST RESEARCH QUESTION: THE SIZE AND STRUCTURE OF THE SCHOOL EFFECT IN THE GREEK *LYCEIA*

5.2.1. INTRODUCTION

The first research question asks whether *lyceia* in the prefecture of Attiki are equally effective in terms of their students' academic achievement. As has been described in Chapter 4, academic achievement in the present study refers to two outcomes: (a) students' normalised grades in 22 nationally examined subjects and (b) students' success in obtaining their certificate for the integrated *lyceum*. To answer this question, a number of linear and non-linear multilevel models were built. The former were fitted to students' normalised grades, whereas the latter investigated the probability of success in obtaining the certificate of the integrated *lyceum*. The explanatory variables in the models were dummy variables with two or more categories at the school or student level. Information on students' previous achievement was available and has been used in the multilevel models which were mentioned above but value added results in this study must be interpreted with caution for reasons that were explained in Section 4.3.3.

The coefficients and the error terms of the models that were built will be presented under different headings because two different data sets were used in the current analysis. The first data set refers to the population of schools in the prefecture of Attiki, the prefecture of the Greek capital. The second data set refers to a stratified random sample of the population of the *lyceia* in Attiki, namely Sample B. As we proceed from the models for the Population to the models for Sample B, the level of available information increases but the number of observations (students and schools) decreases. The models which will be presented in the following sections have been named in such as to enable the reader to understand the sample that they have been based on. For example, the model named 'P' refers to the population, whereas the model named 'B' refers to Sample B. Superscripts and subscripts in the Ps and Bs indicate the complexity and the statistical attributes of the models. For example, Model P_{bin}^{AB} refers to the 'population' (the 'P'), it models a binary response variable (the 'bin'), and includes the explanatory variables of the set 'AB'.

5.2.2. VARIANCE COMPONENTS MODELS FOR THE POPULATION

The first set of model for the population of schools are the models in the 'P^0' series, hence referred to as 'Model P^0'. In fact, Model 'P^0' is not one model but a collection of 22 hierarchical linear models, each one for a different academic outcome (Mathematics, Science etc). The purpose of this set of models is to separate the total variance to variance between schools U_{ij} and $_j$ variance between students R_i. Thus, the models under the umbrella term 'P^0' are of the form: $Y_{ij} = \beta_{0j} + R_{ij}$, where Y_{ij} represents an academic outcome. It is also suggested that $\beta_{0j} = \gamma_{00} + U_{0j}$. In the statistical literature, models of this kind are called 'variance components' models or 'empty' models or 'null' models (Hox, 1995; Snijders & Bosker, 1999). With the help of Model P^0 it was found that the average size of the 'unexplained' intra-school correlation was about 0.10. The variances and the intra-school correlation coefficient for Model P^0 are presented in Table 5.15. In this table, the variances between schools and students are denoted τ_0^2 and σ^2 respectively. The number of schools is 375. The number of students differs across the rows of Table 5.15 because the subjects in the left hand column have different numbers of cases with missing values. The right hand column of Table 5.15 contains the intra-school correlation coefficients (ρ).

Table 5.15. Variance components Model P^0 (N=375 schools).

	M	τ_0^2	σ^2	ρ
Lyceum Certificate	28,656	0.110	0.895	0.109
General Education				
Orthodox Catechism	28,481	0.112	0.888	0.112
Greek Language	28,640	0.099	0.912	0.098
History	28,705	0.089	0.910	0.089
Science	28,705	0.092	0.894	0.093
History of Science	28,705	0.111	0.893	0.111
Mathematics & Statistics	28,643	0.077	0.909	0.078
Sciences Direction				
Biology	9,409	0.105	0.884	0.106
Mathematics	9,412	0.103	0.888	0.104
Physics	9,412	0.120	0.865	0.122
Chemistry	9,382	0.111	0.865	0.114
Humanities Direction				
Ancient Greek	10,896	0.101	0.900	0.101
Latin	10,900	0.083	0.909	0.084
Philosophy (Introduction)	10,900	0.094	0.904	0.094
Modern Greek Literature	10,895	0.100	0.900	0.100
History	10,829	0.100	0.897	0.100
Technology Direction I				
Mathematics	8,127	0.126	0.876	0.126
Physics	8,128	0.141	0.865	0.140
Business Administration	8,138	0.143	0.862	0.142
Information Technology (Operational Systems)	7,937	0.081	0.912	0.082
Information Technology (Programming)	7,698	0.097	0.908	0.097
Economics	9,753	0.092	0.896	0.093

Note: From the initial 30,573 cases, only those with non-zero value are presented here.
The subjects of the Technology Direction II, are not included because only 280 students were registered.

It can be seen in Table 5.15 that the intra-school correlation coefficient in Model P^0 is higher for three subjects in the Technology Direction (Business Administration, Physics and Mathematics), followed by Physics in the Sciences Direction. The lowest intra-school correlation coefficients can be seen in Mathematics & Statistics in General Education (the common core of subjects) and Latin in the Humanities Direction. Thus, greater variation exists between *lyceia* in some subjects. Attention is now given to the ways that student background and process measures help to account for variation in examination results.

5.2.3. EXPLAINING EDUCATIONAL ACHIEVEMENT IN THE POPULATION

The next step after examining the variance components Model P^0, has been to construct more complex models that include all the information available for the population. Two new sets of models have been constructed: P^A and P^{AB}. The former contains information at student level whereas the latter contains information at student and school level. The explanatory variables in the Models P^A and P^{AB} are presented below.

1. Gender	A dummy variable coded '0' for boys and '1' for girls. The base category in Models P^A and P^{AB} are the boys.
2. Year of birth	A dummy variable with three categories: (1) 'born before 1982', (2) 'born in 1982', and (3) 'born after 1982'. The base category in Models P^A and P^{AB} is 'born in 1982'.
3. Direction of studies	A dummy variable with three categories: Humanities, Sciences and Technology. The base category in Models P^A and P^{AB} is the Humanities Direction.
4. School size	The base line for school size in Model P^{AB} is the category 'school size 2 (*i.e.* from 50 to 101 participants). The other three categories are 'school size 1' (up to 49 participants), 'school size 3' (from 102 to 200 participants), and school size 4 (more than 200 participants). The average number of participants per school is 101.79.
5. School type	Two categories have been included in this variable: state schools and private schools. The base category is 'state school'.

The coefficients and the random part of Model P^{AB} are presented in Table 5.16 only for the subjects of General Education as well as for the certificate of the integrated *lyceum*. The other items are not presented at this stage.

Table 5.16. Fixed coefficients and random parts of the 'personal characteristics and contextual Model' P^{AB} (N=375 schools).

	Lyceum Certificate		Religion		Greek Language		History		Science		Biology	
	Coeff.	S.E.	Coeff.	S.E.	Coeff.	S.E.	Coeff.	S.E.	Coeff.	S.E.	Coeff.	S.E.
Fixed part												
γ_{00} (intercept)	**-0.127**	0.024	-0.028	0.025	0.011	0.023	**0.111**	0.023	**-0.403**	0.022	**-0.194**	0.021
γ_{10} (girl)	**0.078**	0.012	**0.246**	0.012	**0.326**	0.011	**-0.037**	0.012	-0.012	0.011	**0.032**	0.011
γ_{20} (born in 1981)	**-0.686**	0.030	**-0.401**	0.030	**-0.559**	0.030	**-0.503**	0.031	**-0.582**	0.028	**-0.535**	0.030
γ_{30} (born in 1983)	-0.015	0.013	**-0.037**	0.013	**-0.048**	0.013	-0.020	0.013	-0.013	0.012	-0.014	0.013
γ_{40} (Technol. Direction)	**-0.280**	0.015	**-0.535**	0.015	**-0.695**	0.014	**-0.502**	0.015	**0.199**	0.014	**-0.216**	0.014
γ_{50} (Sciences Direction)	**0.491**	0.013	**0.141**	0.013	**0.051**	0.013	**0.162**	0.014	**1.043**	0.012	**0.695**	0.013
γ_{01} (private school)	**0.208**	0.052	**0.129**	0.055	**0.146**	0.048	**0.188**	0.050	**0.235**	0.047	**0.164**	0.045
γ_{02} (school size-1)	**-0.246**	0.043	**-0.203**	0.045	**-0.213**	0.040	**-0.165**	0.041	**-0.203**	0.038	**-0.171**	0.037
γ_{03} (school size-3)	**0.073**	0.035	**0.073**	0.037	0.046	0.032	0.044	0.033	0.056	0.031	**0.059**	0.030
Random part												
τ_0^2	**0.071**	0.006	**0.081**	0.007	**0.061**	0.005	**0.063**	0.006	**0.056**	0.005	**0.049**	0.004
σ^2	**0.785**	0.007	**0.782**	0.007	**0.762**	0.006	**0.834**	0.007	**0.677**	0.006	**0.766**	0.006
ρ	0.083		0.101		0.074		0.070		0.076		0.060	
-2 loglikelihood	74911.59		74256.06		73974.12		76583.5		70671.6		74108.5	
Number of cases	28,578		28,352		28,562		28,576		28,576		28,576	

Effects marked in bold are statistically significant at 0.05 level.

Table 5.16. Fixed coefficients and random parts of the 'personal characteristics and contextual Model' P^{AB} (part II).

	History of Science		Mathematics & Statistics	
	Coeff.	S.E.	Coeff.	S.E.
Fixed part				
γ_{00} (intercept)	**-0.109**	0.023	**-0.427**	0.021
γ_{10} (girl)	**0.101**	0.012	**-0.046**	0.011
γ_{20} (born in 1981)	**-0.526**	0.030	**-0.568**	0.028
γ_{30} (born in 1983)	-0.017	0.013	0.005	0.012
γ_{40} (Technol. Direction)	**-0.304**	0.015	**0.310**	0.014
γ_{50} (Sciences Direction)	**0.438**	0.013	**1.065**	0.012
γ_{01} (private school)	**0.208**	0.048	**0.223**	0.044
γ_{02} (school size-1)	**-0.292**	0.040	**-0.184**	0.037
γ_{03} (school size-3)	0.048	0.032	0.056	0.029
Random part				
τ_0^2	**0.059**	0.005	**0.049**	0.004
σ^2	**0.799**	0.007	**0.690**	0.006
ρ	0.069		0.066	
-2 loglikelihood	75359.45		70984.92	
Number of cases	28,576		28,518	

Effects marked in bold are statistically significant at 0.05 level.

By studying Table 5.16, it can be concluded that the intra-school correlation coefficients are around 0.075 on average. This means that according to Model P^{AB}, about 7.5% of the total variation on normalised academic outcomes can be attributed to the school (although in the absence of more detailed intake controls these results must be treated with considerable caution). The smaller value of ρ in Table 5.16 is in the case of Biology of General Education (ρ = 0.060); the highest value is in the case of Greek Orthodox Catechism (ρ = 0.101). For reasons that were explained in Section 4.4.4, direct comparison between coefficients in the P^{AB} family of models is not a safe method for making conclusions about patterns of student achievement. However, the negative coefficients for the dummy variable 'girl' in History, Mathematics, and Science (in the latter the coefficient is not statistically significant) need more investigation.

A very interesting finding of Model P^{AB} is that the differences in achievement between the students who went to school before the age of six and those who went to school at the normal age (six) are small. The coefficients for the dummy variable 'born in 1983' are negative but not statistically significant in the P^{AB} models (0.05 level of significance). The results however are dramatically different for the students who were born before 1982, as their coefficient in Model P^{AB} is negative and statistically significant. It seems that the older students, who either repeated a class or immigrated to Greece due to the geopolitical changes in the former eastern world, are underachieving in *lyceum*.

Differences were also found in the patterns of achievement in relation to the Direction. In the seven examined subjects and the *lyceum* certificate, students who followed the Sciences Direction had had significantly better achievement than the students who followed the other two Directions. The Direction of studies may therefore also be seen as a crude indicator of prior attainment. Finally, the students of the private schools achieved better grades than students of state schools and the students of large schools achieved better grades than students of the small schools. This finding, however, has probably to do with the context of the school. Private schools are selective; small state schools are located in remote areas in the prefecture of Attiki. Thus, the mechanisms for selection in the case of private schools and the average socio-economic status of the neighbourhood in the case of small state schools are two factors that may well explain some of differences in students' achievement.

5.2.4. Graphic representation of school means

In the previous section, it was demonstrated how the explanatory variables in Model P^{AB} reduced the variance at school and student level in relation to the more general Model P^{0}. However, a significant amount of school level variance remained unexplained in Model P^{AB}. The school level variance in Model P^{AB} for *lyceum* certificate is presented in the current section with the help of a 'caterpillar' graph. Specifically, each one of the 375 small triangles in Figure 5.1, represents the mean student achievement for each school in the population, specifically, an estimation of mean student achievement under Model P^{AB}. The schools in the population could either be seen as a sample (one year) of the population of the schools in Greece or as a sample of schools in Attiki prefecture in a longitudinal study. The spaces over and below each triangle represent confidence intervals at the significance level of 0.05. The last triangle on the top right hand side represents a private school of acknowledged quality on the northern fringes of Athens.

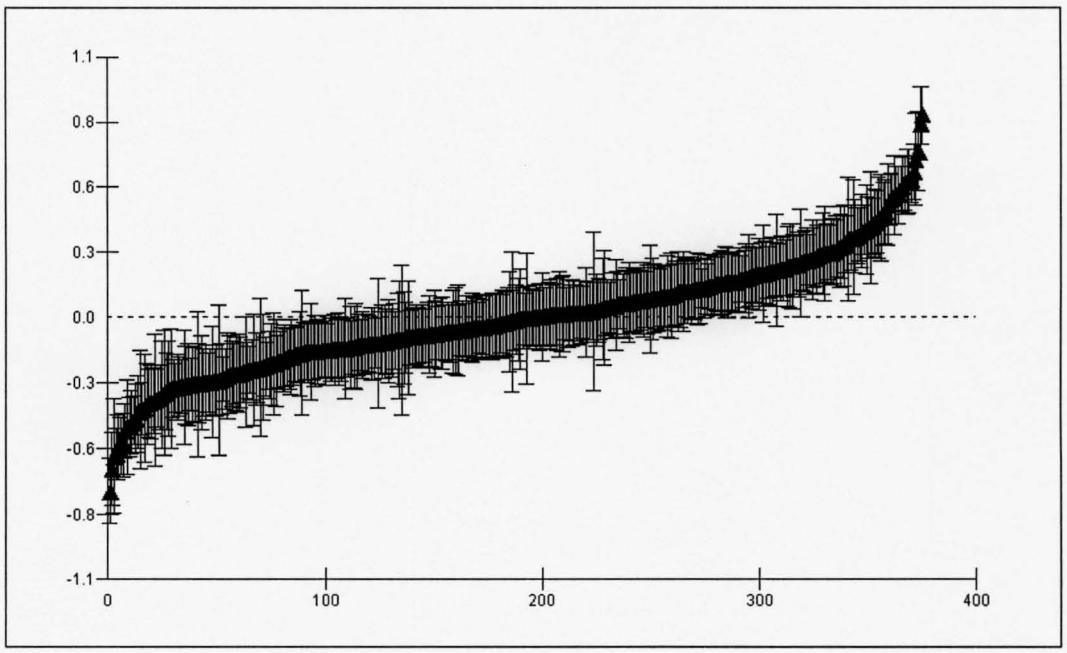

Figure 5.1. Bayesian estimates for the mean student achievement in *lyceum* certificate with comparative confidence intervals at the 5% significance level (Model P^{AB}, 375 schools).

The small triangles in Figure 5.1 represent empirical Bayesian estimates of the schools' means. In hierarchical linear models, empirical Bayes estimates for means are predicted from prior knowledge about the group effects as well as the posterior knowledge that is

based on the observations made about the groups (see page 357 in the Appendix for more information on the logic of Bayesian estimates in hierarchical linear models). What must be stressed here is that the Bayesian estimate for the mean of school j is 'shrunk' to the general mean of a collection of schools. More specifically, if we denote the Bayesian estimate of school j as $\hat{\beta}_{0j}^{EB}$ and the Ordinary Least Squares estimation of the mean of the same school with $\hat{\beta}_{0j}$, then it can be shown that $\hat{\beta}_{0j}^{EB} = \lambda_j \hat{\beta}_{0j} + (1-\lambda_j)\hat{\gamma}_{00}$, where $\hat{\gamma}_{00}$ is the general mean predicted from the total number of students in the data base and λ_j is the reliability of the mean of school j (Snijders & Bosker, 1999: 58). Due to shrinkage effect, the residual estimates of the means in Figure 5.1 can be regarded as 'conservative'. This means that in Figure 5.1 the schools in the upper right hand side and lower left hand side of the graph are presented closer to the doted horizontal line in the centre that splits the graph into two.

Another important point in Figure 5.1 regards the calculation of the standard error. If we denote the standard error for the mean of school j with SE_j, the ninety five percent confidence interval is given by the formula $\hat{\beta}_{0j}^{EB} \pm 1.96 \times SE_j$. However, the confidence intervals in the current study have been designed narrower than that. This is because, as Goldstein & Healy (1995) have shown, if the aim of the research is the simultaneous comparison of a collection means, the width of the confidence interval should be adjusted in such a way that their significance level averaged over all possible pairs is equal to the required value. In the present study, the required value of statistical significance is 5 percent and according to the formula of Goldstein & Healy, (1995) the confidence interval for the mean of school j should be the interval between $\hat{\beta}_{0j}^{EB} - 1.39 \times SE_j$ and $\hat{\beta}_{0j}^{EB} + 1.39 \times SE_j$.

5.2.5. CONTROLLING FOR PREVIOUS ACHIEVEMENT

The only measure of prior academic achievement before the final examinations in third year of *lyceum* is students' academic achievement in the final examinations of year 2. From a statistical point of view examination results of year 2 would be a perfect base for measuring 'value added' results. However, it is from an educational point of view that serious doubts can been raised with regard to the use of examination results in year 2 for predicting achievement in year 3. Firstly, the span between the examination in year 2 and the examination in year 3 is only one school year. Thus, the 'value added' that

would be estimated after controlling for the mean grade in year 2 (the $\overline{B}$) would rather be a 'year effect' and not a 'school effect'. In addition, $\overline{B}$ is itself 'explained' by the variables that statistically 'explain' mean grade in year 3 (the $\overline{G}$). Thus, practically, $\overline{B}$ may be seen as a school product rather than a base line for measuring other school products.

A second source of scepticism concerning the use of achievement in year 2 for predicting achievement in year 3 is the situation which was caused by students' take over of their schools during 1998 – 1999. As has been discussed in Chapter 2, many schools were taken over by their students in 1998 – 1999 for nearly two months. These schools were state *lyceia*. The students in private *lyceia* did not manage to get round their administrators and the profit-making mechanisms that they represented. The different forms of unrest in Greek schools not only affected the quality of teaching and learning in state *lyceia* but also had serious implications for the validity of the examinations in year 2 as a mechanism for selection. Because the decision for taking over a state school was taken 'democratically' by its students (each one had a vote), many children lost their classes against their will. Thus, in the final examinations in year 2 (June 2000), many students would be less prepared not because they had not tried enough but because the government did not offer them the same opportunities as other students. In order to diminish the effects of the unrest on the examination results, the Minister of Education issued a circular to the schools by which he changed the formula for the calculation of the final grade in the *lyceum* certificate. As has been presented in Section 2.3.3, the *lyceum* certificate is given by the formula: $(3\overline{B} + 7\overline{G})/10$, where $\overline{B}$ is the mean grade for year 2 and $\overline{G}$ is the mean grade for year 3. According to the new regulation, which was announced by the Media, $\overline{B}$ would now enter the formula of *lyceum* certificate only if $\overline{B} > \overline{G}$. In every other case, the grade in the *lyceum* certificate would be equal to $\overline{G}$. This was an 'after the event' policy for 'protecting' the students who had not done so well in the final examinations of 1998 – 1999 (only year 2 examinations were conducted in June of 1999).

Notwithstanding the serious caveats which were presented in the two previous paragraphs, achievement in year 2 was finally used in the current study as a predictor of achievement in year 3. This was decided because one of the purposes of the current study was to demonstrate how 'value-added' models could be used by other Greek researchers in the field of educational effectiveness. Greek students who finished

integrated *lyceum* in 2000 were the first to have been examined one year before (June 1999). Thus Model P^0_{year} regressed $\overline{G}$ against $\overline{B}$. The fixed and the random parts of the Model P^0_{year} for the mean grade in year 3 are presented in Table 5.17.

Table 5.17. Model P^0_{year} (375 schools).

	Mean grade in year 3	
	Coeff.	S.E.
Fixed part		
γ_{00} (intercept)	-0.003	(0.007)
γ_{10} (mean grade in year 2)	**0.835**	(0.005)
Random part		
τ_0^2 (level-2 variation – intercept)	**0.015**	(0.001)
τ_1^2 (level-2 variation – slopes)	**0.005**	(0.001)
τ_{01}^2 (level-2 intercept/slope covariance)	-0.001	(0.001)
σ^2 (level-1 variation)	**0.233**	(0.002)

2 loglikelihood (Iterative Generalised Least Squares – IGLS) = 40090.240 (28,224 of 30,573 cases)
Note: Values in bold are statistically significant at 0.005 level.

By examining Table 5.17 we can obtain an idea of the relation between $\overline{B}$ and $\overline{G}$. The coefficient for $\overline{B}$ in Model P^0_{year} is 0.835, a very high value if we consider that it refers to 28,573 students. Model P^0_{year} is a 'random slopes' model. This means that the school in the population could be represented by separate regression lines, the slopes of which have a variance equal to τ_1^2. The term τ_0^2 represents the variance in the intercepts, whereas the term τ_{01}^2 is the intercept/slopes covariance. A negative value of τ_{01}^2 would make the regression lines 'fan in' *i.e.* incline as mean grade in year 2 increases. However, in Table 5.18, τ_{01}^2 is not statistically significant. The relation between $\overline{B}$ and $\overline{G}$ has been visualised in Figure 5.2. In this figure, the abscissa (horizontal axis) represents the values of $\overline{B}$ whereas the ordinate (the vertical axis) the values of $\overline{G}$. Each one of the 375 regression lines in Figure 5.2 predicts $\overline{G}$ for the students of each school in the population. The regression lines differ significantly both in their intercepts and slopes. However, the intercept/slope covariance is not significant and this means that the progress during the final school year is independent of the value of $\overline{B}$.

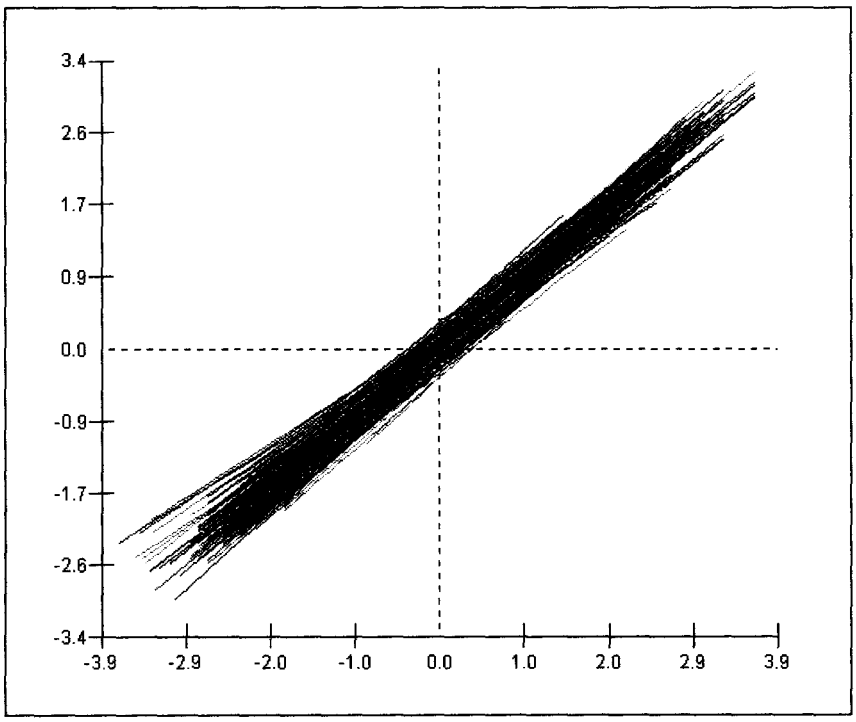

Figure 5.2. 'Mean grade in year 3' (vertical axis) against 'mean grade in year 2' (horizontal axis) for 375 schools (28,224 students).

5.2.6. EXPLORING THE 'SCHOOL YEAR EFFECT'

Having established that achievement in year 2 is highly correlated with achievement in year 3, Model P^{AB} was merged with Model P^{0}_{year} and a new model was constructed. This new model has been named P^{AB}_{year} and includes all the explanatory variables of P^{AB} plus $\overline{B}$, the students' mean achievement in year 2. This model is presented in Table 5.18, for the seven subjects of General Education.

Table 5.18. Contextual and previous achievement Model P^{AB}_{year} for the population.

	Mean grade yr-3		Religion		Greek Language		History		Science		Biology	
	Coeff.	S.E.	Coeff.	S.E.	Coeff.	S.E.	Coeff.	S.E.	Coeff.	S.E.	Coeff.	S.E.
Fixed part												
γ_{00} (intercept)	0.011	(0.011)	**0.075**	(0.019)	**0.121**	(0.014)	**0.225**	(0.016)	**-0.287**	(0.013)	**-0.080**	(0.014)
γ_{10} (girl)	0.002	(0.006)	**0.189**	(0.009)	**0.264**	(0.009)	**-0.102**	(0.009)	**-0.077**	(0.007)	**-0.031**	(0.008)
γ_{20} (born in 1981)	**-0.140**	(0.018)	0.003	(0.025)	**-0.158**	(0.023)	-0.040	(0.024)	**-0.128**	(0.019)	**-0.086**	(0.022)
γ_{30} (born in 1983)	**0.014**	(0.007)	**-0.014**	(0.010)	**-0.025**	(0.009)	0.004	(0.010)	0.011	(0.008)	0.011	(0.009)
γ_{40} (Techn. Direction)	**0.030**	(0.008)	**-0.344**	(0.011)	**-0.463**	(0.011)	**-0.295**	(0.011)	**0.407**	(0.009)	-0.005	(0.010)
γ_{50} (Sciences Direction)	0.012	(0.008)	**-0.241**	(0.011)	**-0.350**	(0.010)	**-0.257**	(0.010)	**0.621**	(0.008)	**0.274**	(0.009)
γ_{01} (private school)	**0.067**	(0.023)	0.018	(0.043)	0.024	(0.030)	**0.057**	(0.033)	**0.116**	(0.027)	0.033	(0.028)
γ_{02} (school size-1)	**-0.095**	(0.020)	**0.088**	(0.036)	**-0.072**	(0.025)	-0.032	(0.027)	**-0.071**	(0.022)	-0.031	(0.024)
γ_{03} (school size-3)	**0.030**	(0.015)	0.042	(0.029)	0.015	(0.009)	0.012	(0.021)	0.024	(0.017)	0.025	(0.018)
γ_{60} (mean in year 2)	**0.830**	(0.005)	**0.635**	(0.006)	**0.664**	(0.006)	**0.697**	(0.006)	**0.699**	(0.005)	**0.703**	(0.006)
Random part												
τ_0^2	**0.012**	(0.001)	**0.050**	(0.004)	**0.020**	(0.002)	**0.024**	(0.002)	**0.016**	(0.002)	**0.018**	(0.002)
τ_1^2	**0.005**	(0.001)	**0.004**	(0.001)	**0.005**	(0.001)	**0.005**	(0.001)	**0.005**	(0.001)	**0.006**	(0.001)
$\tau_{0\cdot6}^2$	-0.001	(0.001)	**-0.002**	(0.001)	-0.001	(0.001)	0.000	(0.001)	0.000	(0.001)	-0.001	(0.001)
σ^2	**0.232**	(0.002)	**0.455**	(0.004)	**0.410**	(0.004)	**0.441**	(0.004)	**0.283**	(0.002)	**0.366**	(0.003)
-2 loglikelihood	39684.95		58314.41		55617		57756.92		45309.29		52448.16	
Number of cases	28,187		27967		28,174		28,187		28,187		28,187	

Effects marked in bold are statistically significant at 0.05 level.

Table 5.18. Model P^{AB}_{year} (continued).

	History of Science		Mathematics	
	Coeff.	S.E.	Coeff.	S.E.
Fixed part				
γ_{00} (intercept)	**0.066**	(0.016)	**-0.317**	(0.012)
γ_{10} (girl)	**0.039**	(0.008)	**-0.106**	(0.008)
γ_{20} (born in 1981)	**-0.103**	(0.023)	**-0.133**	(0.021)
γ_{30} (born in 1983)	0.006	(0.009)	**0.028**	(0.008)
γ_{40} (Techn. Direction)	**-0.097**	(0.011)	**0.514**	(0.010)
γ_{50} (Sciences Direction)	0.018	(0.010)	**0.659**	(0.009)
γ_{01} (private school)	**0.072**	(0.035)	**0.100**	(0.025)
γ_{02} (school size-1)	**-0.152**	(0.029)	**-0.057**	(0.022)
γ_{03} (school size-3)	0.013	(0.023)	0.023	(0.016)
γ_{60} (mean in year 2)	**0.695**	(0.006)	**0.674**	**(0.006)**
Random part				
τ_0^2	**0.031**	(0.003)	**0.013**	(0.001)
τ_1^2	**0.005**	(0.001)	**0.005**	(0.001)
$\tau_{0\cdot6}^2$	-0.001	(0.001)	-0.001	(0.001)
σ^2	**0.408**	(0.003)	**0.327**	(0.003)
-2 loglikelihood	55637.18		49120.37	
Number of cases	28,187		28,132	

Effects marked in bold are statistically significant at 0.05 level.

Because the regression lines in Figure 5.2 have random slopes except for random intercepts, the within school coherence in Model P_{year}^{AB} cannot be expressed by the intra-class correlation coefficient that was defined in Section 4.4.2. This is because the correlation between the mean grades in year 3 for two random individuals in the same school depends on their initial mean grades in year 2. In other words, the variance in Model P_{year}^{AB} is considered the sum of the variances of all random variables in the model plus a term depending on the covariance of the random variables. In Model P_{year}^{AB} the school-level variance is the sum of two variances: the variance of the intercept U_{0j} and the variance of the slopes U_{1j}. Model P_{year}^{AB} has been constructed in such a way that U_{1j}. is multiplied by $\overline{B}$. Thus, the school level variance in Model P_{year}^{AB} is given by the quadratic function: $\text{var}(U_{0j} + U_{1j} \cdot \overline{B}) = \tau_0^2 + 2\tau_{01}^2 \cdot \overline{B} + \tau_1^2 \cdot \overline{B}^2$. The visual representation of this function is presented in Figure 5.3.

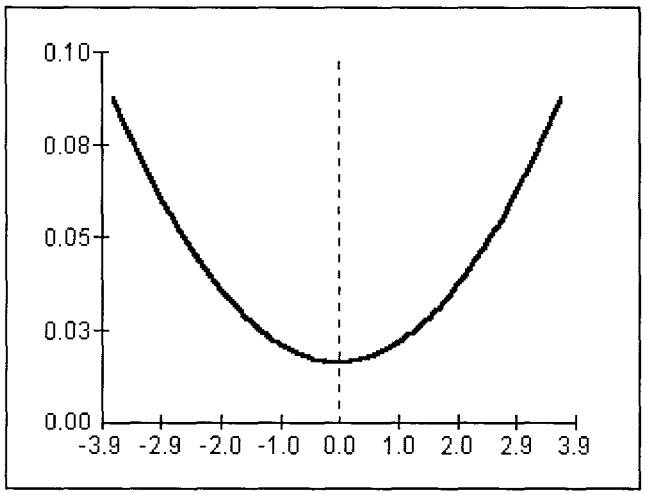

Figure 5.3. Total variable at school level (vertical axis) as a function of mean grade in year 2 (horizontal axis).

By examining Figure 5.3, we can see how $\overline{B}$ affects the total amount of variance at school level. Very large and very small values of mean grade in year 2 are related to larger variance in mean grade in year 3 at school level. The use of $\overline{B}$ as an explanatory variable for students' achievement in year 3 may be tempting from a statistical point of

view but at the same time is problematic from an educational point of view. Therefore, mean achievement in year 2 has not been included in multilevel models that will follow.

5.2.7. Modelling success with non-linear multilevel models

Success or failure in obtaining a *lyceum* certificate is another very important aspect of the students' academic achievement. The models which have been presented so far have analysed students' normalised grades but have not touched on the issues of failure. In order to investigate the structure of success or failure, non-linear hierarchical models were built.

The students who succeeded in a obtaining *lyceum* certificate had achieved a score equal to or higher than 9.5 (the upper level was 20.0). As discussed in the previous chapter, a dichotomous variable (Y_{ij}) was constructed which was coded '0' if student i in school j achieved a grade between 0 to 9.49 and '1' if student achieved a grade equal to or higher than 9.50. From the 30,573 students who participated in the examinations of 2000, 28,643 obtained their *lyceum* certificate and only 1,838 did not (92 cases were missing). The ratio of success in the population was thus 28,643/30,573 = 0.936.

At the first stage, an 'empty' non-linear hierarchical model was constructed in order to investigate the ratio of success which was presented in the previous paragraph. This model was named P^0_{bin} and was of the form of $Y_{ij} = P_j + R_{ij}$, where P_j is the probability of obtaining lyceum certificate in school j and R_{ij} is the error term. It has been found that $logit(P_j) = 2.621(0.051) + U_{0j}$. The variance of U_{0j} is τ_0^2=0.742, with a standard error of 0.071. Thus, the probability of success corresponding to the average value γ_0 is $p = [1 + \exp(-x\beta)]^{-1} = [1 + \exp(-2.621)]^{-1} = 0.932$. This estimated value is very close though not perfectly equal to the calculated ratio of success in the population which was presented in the previous paragraph (0.936). Snijders & Bosker (1999: 214) also offer a proximate formula for the estimation of the variance of P when τ_0^2 is not very small. The formula is $var(P_j) \approx [\pi_0(1-\pi_0)]^2 \tau_0^2$ and with substitution it yields $var(P_j) \approx 0.047$. Thus the standard deviation of P_j is $\sqrt{0.047} = 0.217$.

In order to investigate the structure of the probability of success in the *lyceum* certificate, a new non-linear hierarchical model was built. This new model was named P_{bin}^{AB} and included all the explanatory variables of Model P^{AB}. The fixed and the error part of Model P_{bin}^{AB} for the outcome 'success in *lyceum* certificate' are presented in Table 5.19 that follows.

Table 5.19. Hierarchical logistic regression coefficients for success in obtaining certificate of integrated *lyceum* (Model P_{bin}^{AB}).

	Success in *lyceum* certificate	
Fixed part	Coefficient	S. E.
γ_{00} (intercept)	**2.705**	0.080
γ_{10} (girl)	0.023	0.054
γ_{20} (born in 1981)	**-1.266**	0.083
γ_{30} (born in 1983)	0.093	0.065
γ_{40} (Techn. Direction)	**-0.136**	0.063
γ_{50} (Sciences Direction)	**0.577**	0.069
γ_{01} (private school)	0.148	0.150
γ_{02} (school size-1)	**-0.659**	0.118
γ_{03} (school size-3)	**0.233**	0.099
Random part		
τ_0^2 (school-level variance)	**0.437**	0.049
Number of cases	28,573	

Effects marked in bold are statistically significant at 0.05 level.

For reasons which were discussed in Section 4.4.5, the coefficients in Table 5.19 do not have a linear effect on the probability of success in *lyceum* certificate. However, a positive value for a fixed effect still results in a positive correlation between the value of the predictor and the resulting proportion success. Model P_{bin}^{AB} shows that the variables which help to 'explain' in a statistical sense, variables in academic achievement are also relevant in explaining success in *lyceum* certificate. The coefficients for 'girl', 'born in 1983' and 'private school' are not statistically significant at the 0.05 level. However, school size – a variable connected with the status of school's neighbourhood – is, like in Model P^{AB}, a significant factor in success. If we work out the antilogarithm function for the statistically significant coefficients of Table 5.19 we can also calculate the probability of success for any category in Model P_{bin}^{AB}. For example, the probability of success for the students who were born in 1981 – a very significant factor in the

explanation of failure – is given by the formula: $p = [1 + \exp(-x\beta)]^{-1}$. Substitution yields $[1 + \exp(1.266 - 2.705)]^{-1} = 4.2165$. Thus, students who were born before 1982 have less than 50% a probability (specifically, 42%) than the average student in Model P_{bin}^{AB} of succeeding in the *lyceum* certificate.

5.2.8. More measures of social background

In Section 5.2.5 two arguments were presented against using academic achievement in year 2 for predicting academic achievement in year 3. It was stated then that $\overline{B}$ (the mean achievement in year 2) can be seen as a school 'product' rather than a pure base line for measuring school effects on student progress. In fact, $\overline{B}$ can be partially 'explained' by the same set of background factors which 'explain' achievement in year 3. Therefore, interesting variables on students' background (like socio-economic status, *Frontisterion*-attending etc) would lose their explanatory power if $\overline{B}$ was also included in the models. In order to study the impact of other explanatory variables on student-level (excluding the impact of previous achievement) a number of multilevel models were constructed which were given the generic name 'Model B'. Table 5.20 presents the variance components Model B^0 for Sample B.

Table 5.20. Model B^0: Variance components model for Sample B.

	Lyceum Certificate		Religion		Greek Language	
	Coeff.	S.E.	Coeff.	S.E.	Coeff.	S.E.
Fixed part						
γ_{00} (intercept)	-0.024	0.049	**-0.018**	0.05	-0.021	0.053
Random part						
τ_0^2	**0.058**	0.021	**0.064**	0.022	**0.076**	0.025
σ^2	**0.966**	0.041	**0.908**	0.039	**0.914**	0.039
ρ	0.057		0.066		0.077	
-2 log likelihood	3270.721		3196.112		3215.442	
Number of cases	1153		1150		1153	

	History		Science		Biology	
	Coeff.	S.E.	Coeff.	S.E.	Coeff.	S.E.
Fixed part						
γ_{00} (intercept)	-0.037	0.048	-0.018	0.049	-0.041	0.048
Random part						
τ_0^2	**0.057**	0.020	**0.061**	0.021	**0.057**	0.021
σ^2	**0.928**	0.039	**0.893**	0.038	**0.957**	0.041
ρ	0.058		0.064		0.056	
-2 log likelihood	3225.496		3183.37		3260.139	
Number of cases	1153		1153		1153	

	History of Science		Mathematics	
	Coeff.	S.E.	Coeff.	S.E.
Fixed part				
γ_{00} (intercept)	-0.033	0.041	-0.035	0.046
Random part				
τ_0^2	**0.045**	0.017	**0.052**	0.019
σ^2	**0.885**	0.038	**0.907**	0.038
ρ	0.048		0.054	
-2 log likelihood	3166.965		3196.926	
Number of cases	1153		1153	

Effects marked in bold are statistically significant at 0.05 level.

An elaborated form of Model B^0 is Model B^A, which contains 10 explanatory variables, all of them at student level. The construction of Model B^A was based on Model P^{AB}. However, two school level variables which were used in Model P^{AB}, namely school size and type, were not included in Model B^A. As was explained on page 193 the schools in Sample B, on which Model B^A is based, are state schools with sizes near the overall school average (the 101,79 participants). Therefore there was no reasons for the

variables 'school type' and 'school size' to be included in the model. New variables in Model B^A are related to socio-economic status and are (a) 'father being a professional', (b) 'mother with university degree' (c) 'attending *frontisterion*', and (d) 'taking private lessons at home'. Student's previous achievement was not used in the Model B^A because the purpose of this model is to measure the impact of student background characteristics on attainment – as opposed to progress – more clearly. Had previous achievement been included in Model B^A, the intra-school correlation coefficient would probably have been lower. This however was not the reason for not using previous achievement in Model B^A. The researcher has explained the problems that are connected with previous achievement in the context of the current study (see Section 4.3.3). The fixed and error parts of Model B^A are presented in Table 5.21.

The collection of information on students' socio-economic backgrounds has made it possible to test the 'iron rule of educational research' according to which mother's educational level and father's occupation play an important role in their sons' and daughters' academic achievement. In Model B^A the coefficient for the category 'mother with university degree' (a combination of categories 6, 7, and 8 in Table 5.5) is positive and statistically significant in every subject of General Education and the *lyceum* certificate. In addition, it can be seen that students whose father is a *leitourgos*[1] – *i.e.* doctor, lawyer, or judge – achieve better grades than other students in *lyceum* certificate and in a number of subjects of General Education.

[1] The word *leitourgos* (functionary) does not have derogatory connotations in Greek in contrast to English. In Greek, functionaries are not only the higher public officers (civil servants) but also professionals of high status in the private sector.

Table 5.21. Fixed and random parts for linear models with more personal student characteristics (Model B^A).

	Lyceum Certif.		Religion		Greek Language		History		Science		Biology	
	Coeff.	S.E.	Coeff.	S.E.	Coeff.	S.E.	Coeff.	S.E.	Coeff.	S.E.	Coeff.	S.E.
Fixed part												
γ_{00} (intercept)	**-0.389**	0.097	**-0.254**	0.101	**-0.229**	0.096	-0.097	0.099	**-0.616**	0.088	**-0.364**	0.098
γ_{10} (girl)	0.002	0.060	**0.201**	0.060	**0.279**	0.058	-0.073	0.061	-0.059	0.054	-0.067	0.060
γ_{20} (born in 1981)	**-0.819**	0.163	**-0.434**	0.162	**-0.575**	0.156	**-0.481**	0.165	**-0.600**	0.148	**-0.614**	0.162
γ_{30} (born in 1983)	-0.026	0.065	-0.020	0.065	-0.036	0.063	0.017	0.066	-0.067	0.059	-0.044	0.065
γ_{40} (Techn. Direction)	**-0.374**	0.072	**-0.491**	0.073	**-0.670**	0.070	**0.542**	0.074	**0.214**	0.066	**0.230**	0.072
γ_{50} (Sciences Direction)	**0.462**	0.069	**0.224**	0.069	0.090	0.066	**0.141**	0.070	**1.016**	0.062	**0.676**	0.068
γ_{40} (father professional)	**0.164**	0.076	0.110	0.076	**0.205**	0.073	0.094	0.077	0.161	0.069	0.138	0.076
γ_{50} (mother with university degree)	**0.385**	0.060	**0.250**	0.060	**0.342**	0.057	**0.355**	0.061	**0.279**	0.054	**0.276**	0.060
γ_{60} (attend *frontisterion*)	**0.158**	0.070	0.102	0.070	0.084	0.068	0.062	0.071	**0.132**	0.064	0.129	0.070
γ_{70} (home tuition)	0.112	0.062	0.032	0.062	-0.003	0.060	0.060	0.063	0.086	0.067	0.025	0.062
γ_{80} (computer at home)	**0.125**	0.055	0.072	0.055	0.094	0.053	0.092	0.056	**0.126**	0.050	0.095	0.055
Random part												
τ_0^2	**0.029**	0.013	**0.052**	0.018	**0.048**	0.017	**0.033**	0.014	**0.024**	0.011	**0.035**	0.014
σ^2	**0.790**	0.033	**0.783**	0.033	**0.725**	0.031	**0.814**	0.035	**0.653**	0.028	**0.781**	0.033
ρ	0.035		0.062		0.062		0.039		0.035		0.043	
-2 log likelihood	3023.16		3018.323		2937.129		3059.811		2804.05		3014.692	
Number of cases	1151		1148		1151		1151		1151		1151	

Effects marked in bold are statistically significant at 0.05 level

Table 5.21. Model B[A] (part II).

	History of Science		Mathematics & Statistics	
	Coeff.	S.E.	Coeff.	S.E.
Fixed part				
γ_{00} (intercept)	**-0.232**	0.095	**-0.690**	0.087
γ_{10} (girl)	0.006	0.059	-0.068	0.054
γ_{20} (born in 1981)	**-0.582**	0.161	**-0.626**	0.147
γ_{30} (born in 1983)	0.000	0.065	-0.071	0.059
γ_{40} (Techn. Direction)	**-0.324**	0.072	**0.314**	0.065
γ_{50} (Sciences Direction)	**0.408**	0.068	**1.048**	0.062
γ_{40} (father professional)	0.115	0.075	**0.173**	0.069
γ_{50} (mother with university degree)	**0.246**	0.059	**0.338**	0.054
γ_{60} (attending frontisterion)	0.053	0.069	**0.129**	0.063
γ_{70} (home tuition)	0.096	0.062	0.093	0.056
γ_{80} (computer at home)	0.052	0.054	**0.131**	0.050
Random part				
τ_0^2	**0.024**	0.012	**0.021**	0.010
σ^2	**0.776**	0.033	**0.643**	0.027
ρ	0.030		0.032	
-2 log likelihood	2999.795		2783.486	
Number of cases	1159		1151	

Effects marked in bold are statistically significant at 0.05 level.

The relation between parents' socio-economic status (SES) and students' academic achievement is something that educational research has illustrated from the 1960s onwards (e.g. the works of Coleman *et al.*, 1966, Plowden, 1967, and Jencks *et al.*, 1972). In the Greek literature, Professor Andreas Kazamias, has called the relation between SES and academic achievement 'the iron rule of educational research' (Kazamias, 1995). However, this 'iron rule' has never been verified in the Greek context. Firstly, as we saw in Section 2.2.3, Greek thinkers in the sphere of education have focused on the role of schooling as a mechanism for economic growth rather than the possible role of schooling in terms of promoting equality and social justice. Secondly, large-scale sociological studies are usually based on educational statistics and such statistics are not normally available in Greece.

However, the relation between achievement and socio-economic status is well known among Greek academics but only indications of it exist in the literature. For example Antoninis & Tsakloglou (2001) analysed the data of the 1993 – 1994 Household Budget Survey in Greece and wrote recently that 'children of better-off families are over-represented in tertiary education' (p. 218). It is not unusual for many Greek researchers to approach the issue of educational inequalities from an organisational rather than a sociological point of view. Such an approach has been made in Greece by Kassotakis & Papageli (1996) who have based their study concerning Greek students' access to tertiary education on percentages and other simple statistical measures of central location.

Another important and new finding in Model B^A is the effect of *frontisterion* and *idiaiteron* on students' achievement. As discussed in Section 2.1.3, the *frontisterion* can be seen as both a reflection and a probable cause of the low quality of the Greek school system. The contribution of the *frontisterion* to educational inequalities is large. The exact effects of *frontisterion* attendance on academic achievement is difficult to measure in detail because the word of the evening cramming schools – the *frontisteria* – is inaccessible and secretive. However, it is clear in Model B^A that *frontisterion* attendance (as reported by students themselves) has had a significant positive impact on academic achievement, especially in the subjects which are associated with the exact sciences: Mathematics, Biology, and Science. It seems, therefore, that 'under the table' education is more useful for the subjects which require procedural rather than declarative kinds of knowledge.

Interestingly, private tuition at home, in contrast to *frontisterion* attendance, appears to have no statistically significant impact on students' achievement; the coefficients for 'home tuition' are positive but not statistically significant in Model B^A. This piece of information may be useful for Greek parents who often invest a larger amount of money in private tutoring instead of a *frontisterion*. However, the lack of significant impact from private tuition on academic achievement may as well be attributed to the reasons why the parents of a specific student choose this form of additional education. For example, it may be that private tuition is being used by students who have already been low-achievers or those who have difficulties with a specific subject. As Model P^0_{year} has shown, low achievement is something that remains partly steady from one school year to the next. Finally, Table 5.22 presents the 39 schools of Sample B, ranked according to Bayesian estimates of their average students' achievement. The grey areas indicate the schools which are either below or above average with a 95% level of statistical significance. It seems that schools are consistently effective for a range of subjects.

Table 5.22. The 39 schools of Sample B ranked according to Bayesian estimates of their average students' achievement.

	1st	2nd	3rd	4th	5th	6th	7t	8t	9th	10th	11th	12th	13th	14th	15th	16th	17th	18th	19th	20th	21st
Religion	38	25	14	27	8	1	16	31	39	13	15	34	24	17	20	22	5	35	21	28	6
Greek Lang.	5	35	12	38	27	25	17	13	39	30	10	6	31	21	14	8	28	9	1	11	32
History	27	38	39	31	5	37	17	32	1	24	14	35	12	9	8	33	30	6	13	2	11
Science	5	39	34	25	32	27	33	31	38	12	17	35	13	11	7	9	30	8	20	2	10
Biology	5	39	35	17	24	38	25	34	13	27	21	18	33	31	14	1	8	37	15	19	30
Mathematics	27	12	35	31	39	34	21	38	5	6	13	7	25	10	8	32	15	17	30	28	36
History of Sci.	36	27	17	31	39	38	35	12	5	24	32	14	8	34	21	37	29	20	13	11	30

22nd	23rd	24th	25th	26th	27th	28th	29th	30th	31st	32nd	33rd	34th	35th	36th	37th	38th	39th	
23	37	7	11	30	10	32	12	2	33	9	4	26	19	18	3	29	36	Religion
33	20	23	24	7	37	18	19	15	16	36	22	34	2	26	29	4	3	Greek Lang.
23	25	18	21	19	36	20	10	28	34	7	16	22	3	15	4	29	26	History
24	29	21	16	1	18	19	23	15	14	6	36	37	28	4	26	22	3	Science
16	12	29	7	6	9	3	20	26	10	32	22	11	28	23	36	2	4	Biology
33	19	37	24	23	14	2	22	11	9	16	3	26	20	4	18	1	29	Mathematics
16	9	10	6	1	33	25	18	2	7	3	22	28	23	15	4	19	26	History of Sci.

Note: -Grey colour indicates that a school is either below or above average in a 95% level of statistical significance.

Below average Average Above average **1st... 39th:** school rank

5.2.9. Conclusions

In the previous sections, the phrase 'effective school' has meant the schools the students of which achieved higher grades than expected, given their year of birth, gender, Direction of studies, school size and type, and an arguable measure of previous achievement. The multilevel linear models which have been built so far have been associated with two distinct data sets: the population of the schools in Attiki and a stratified random sample of this population. These models can be seen as contextual ones. The outcomes were at first adjusted for intake characteristics but not for prior achievement. No private schools were included in Sample B. The first research question of the current study asks if schools are equally effective in terms of their students' academic achievement. The answer to this question seems to be negative. As in other educational contexts, schools seem to make a difference also in Greece. From the analysis of the normalised examination results of June 2000 (population) it has been found that private *lyceia* have higher results than state *lyceia* and that large *lyceia* have higher results than small *lyceia*. The analysis, however, has not made it possible to explain the reasons for the difference in the results because vital contextual information is lacking.

In the 'empty' Model P^0, it has been found that the average 'unexplained' intra-school correlation for the seven subjects of General Education in the population is about 0.10. This coefficient was reduced to around 0.07 – on average – in Model P^{AB}, the more elaborated model for the population. When previous achievement (one year before) was added, Model P_{year}^{AB} yielded a school-level variance of around 0.03 (see Table 5.18). However, it must be noted that the 'value-added' models in the current study suffer from significant limitations in that they only cover progress over a one-year period and the Greek context of student arrest means that the prior attainment measure is of doubtful quality. In the 'variance component' model for Sample B, the average intra-school correlation coefficient is around 0.06. This coefficient has dropped to an average value of 0.04 in the elaborated Model B^A. The amount of variance that is statistically 'explained' by the school-factor in models P^{AB}, P_{year}^{AB}, and B^A is very close to the findings of Scheerens & Bosker (1997), as presented in Section 3.6 of the current work.

Except for differences in academic achievement, schools have been found to differ in terms of their students' likelihood of success in the *lyceum* certificate. With the help of

the hierarchical non-linear Model P_{bin}^{AB}, it has been found that variance of the logistic intercept term τ_0^2 is about 0.432 with a standard error of 0.049. The estimated ratio of success in the population is 0.932 or 93%, a very high percentage of successful students. The high rate of success in the *lyceum* certificate can best be interpreted as a result of the system's 'overproduction' of high achievers rather than an indicator of good educational practices in schools. The standard deviation of the probability of success in the *lyceum* certificate was calculated to be 0.217. Thus, in some *lyceia* the students have a better chance of obtaining their certificate than the others.

In the population of schools, the student-level factors which help to explain success in obtaining the *lyceum* certificate (a binary outcome) are the same as the factors which help to explain academic achievement. These factors are students' year of birth, sex, and Direction of studies. Specifically, it has been found that, with the exception of Mathematics and History, girls achieve higher grades than boys. For Science, the coefficient for 'girls' is negative but not significantly different from zero. 'Direction of studies' is also a significant factor in explaining achievement in the seven subjects of General Education. Specifically, students who attended the Technology Direction achieved on average lower grades than the grades of the other two Directions. In turn, the students who attended the Sciences Direction achieved on average higher grades than students of the other two Directions. It should be noted that the choice of Direction can be seen as a crude indicator of prior attainment in that more able students tend to opt for the Sciences Direction, which is perceived as more challenging.

When social background factors were entered into the models, it was found that students with an advantaged family background achieved better grades than the other students. In the current study, the advantaged family background includes a mother with a university degree, a father who is a functionary and the access to a computer at the student's home. Students' social background includes an indicator of learning opportunities outside school: *Fronisteria* and private lessons at home. It has been found that private lessons do not affect achievement in a statistically significant way for the students in the sample. By contrast, the *frontisterion* is an important factor for achievement, especially for subjects associated with a procedural rather than a declarative type knowledge. Further research on these aspects of lateral education is required in order to understand their impact on students' achievement.

The 375 schools of the study have been ranked according to Bayesian estimates of their students' mean achievement. In Figure 5.1 school differences are clearly pictured on the left and the right hand side of the 'caterpillar' graph. The schools in which student achievement is significantly higher of lower than the average are those for which the confidence intervals do not overlap. The identity of the first school in the far right of the graph will not made known but it is one of the 'good' private schools in the northern suburbs of Athens. Whether this school is really the most effective school in the prefecture of Attiki is a matter for further discussion which would need additional information about students' previous attainment. Unfortunately, with the data available, the current study can only initiate a number of discussions on the features of the more or less effective schools but definite answers are very difficult to give. Statements about the quality of individual schools need to be reinforced by other researchers who will have access to crucial information on educational inputs, outputs and processes. Given the fact that there is no official mechanism in Greece for monitoring the quality of the educational system, no predictions about when or how this information will come can be made.

5.3. ANSWERING THE SECOND RESEARCH QUESTION: MODELLING SCHOOL EFFECTS IN THE SOCIAL DOMAIN

5.3.1. NEW CODES FOR STUDENT RESPONSES

The second research question asks whether *lyceia* are equally effective in a number of aspects related to the social domain. In order to answer this question, 33 schools (Sample C) have been compared on the basis of their students' reported satisfaction from the information that they receive on four important issues: (a) vocational orientation, (b) ethnic and religious minorities, (c) sexually transmitted diseases, and (d) drugs. The investigation of students' opinions was conducted with a questionnaire that was administered to the students of Sample C. In this questionnaire, each one of the above mentioned areas of investigation corresponded to a single item comprising four possible answers that were coded: 'very dissatisfied', 'dissatisfied', 'satisfied' and 'very satisfied'. For reasons which were presented in Section 4.3.7, the option of middle or 'neutral' category was not offered to the students. The distributions of the responses to the four areas of investigation have been presented in Table 5.11 (page 246).

As it can be seen in Table 5.11 the distribution of students' answers in the four items that were presented in the previous paragraph does not approach normality. Firstly, there is a notional gap between the area of 'satisfaction' and the area of 'dissatisfaction' in the items and, secondly, 'dissatisfaction' is over represented. In order to get round these problems, students' answers were re-coded in such a way that the items were transformed in dichotomous variables. Specifically, any answer in the 'satisfaction' area was coded '1', whereas any answer in the 'dissatisfaction' area was coded '0'. The numbers of answers in the satisfaction-dissatisfaction dichotomies are presented in Table 5.23.

Table 5.23. Students' responses in four selected areas (Sample C).

	Satisfied	Dissatisfied
Item		
Vocational training	156 (15.7%)	835 (84.3%)
Minorities	167 (16.9%)	824 (83.1%)
Sexually transmitted diseases	252 (25.4%)	739 (74.6%)
Drug taking	178 (18.0%)	813 (82.0%)

5.3.2. HIERARCHICAL LOGISTIC MODELS

In order to investigate possible school differences in the four areas which were presented in Table 5.23, a number of hierarchical logistic regression models have been built. The models are of the form $Y_{ij} = P_j + R_{ij}$, where Y_{ij} is the satisfaction-dissatisfaction dichotomous variable, P_j is the probability of student i in school j being satisfied, and R_{ij} is the error term. These models are given under the generic name 'C^0_{bin}' because they refer to binary outcomes and do not include explanatory variables. The intercepts and error terms of these models are presented in Table 5.24.

Table 5.24. Coefficients and error terms for Model C^0_{bin}.

	Vocational Orientation		Minorities		Sexually transmitted diseases		Drugs	
	Coeff.	S.E.	Coeff.	S.E.	Coeff.	S.E.	Coeff.	S.E.
Fixed part								
γ_{00} (intercept)	**-1.614**	0.146	**-1.557**	0.117	**-1.029**	0.141	**-1.483**	0.111
Random part								
τ_0^2 (school level variance)	**0.444**	0.171	0.213	0.111	**0.477**	0.163	0.177	0.099

Effects marked in bold are statistically significant at 0.05 level.

The intercept terms in Table 5.24 are predictors of the probability of student i in school j being satisfied with the discussions which are conducted in the four selected areas. If we work out the anti-logit formula that was presented in Section 5.2.7 we will find the predicted values of the probabilities for satisfaction in the four areas. In Table 5.25, the predicted values of probability of satisfaction are compared with the observed values for

satisfaction from Table 5.23. For example, the observed probability for 'vocational training' is 156/(156+835)=0.175.

Table 5.25. Comparing observed probability with probability estimated from Model C^0_{bin}.

	Observed probability	Probability estimated from Model C^0_{bin}.
Item		
Vocational training	0.157	0.166
Minorities	0.169	0.174
Sexually transmitted diseases	0.254	0.263
Drug taking	0.180	0.185

We can see in Table 5.24 that schools do not differ in terms of the estimated probability of satisfaction in the areas of 'minorities' and 'drugs'. More specifically, the confidence intervals for the estimation of the true population values (0.05 level of significance) is for 'minorities' $0.177 \pm 1.96 \times 0.099$ and for 'drugs' $0.213 \pm 1.96 \times 0.111$. Both confidence intervals include zero, meaning that schools do not differ significantly in respect of these two areas. Schools, however, differ in terms of their students' level of satisfaction with the discussions that take place in the areas of 'vocational orientation' and 'sexually transmitted diseases'. The school level variance in these two areas is larger than two times the standard error.

In another analysis, 'vocational orientation' and 'sexually transmitted diseases' were regressed against a number of variables referring to students' characteristics. It was found that girls and students' whose fathers are functionaries have less chance of being satisfied with the discussions which take place in the area of vocational orientation. Satisfaction with the discussions in the area of sexually transmitted diseases cannot be 'explained' by any of the student background variables in the data set. The coefficients and the school level variance for 'vocational orientation' and 'sexually transmitted diseases' are presented in Table 5.26.

Table 5.26. Social outcomes (Model C^{A}_{bin}).

	Vocational orientation		Sexually transmitted diseases	
	Coeff.	S.E.	Coeff.	S.E.
Fixed part				
γ_{00} (intercept)	**-1.288**	0.179	**-0.943**	0.169
γ_{10} (girl)	**-0.525**	0.194	-0.097	0.149
γ_{20} (Father professional)	**-0.720**	0.299	-0.222	0.219
Random part				
τ_0^2 (school-level variance)	**0.453**	0.175	**0.484**	0.163

Effects marked in bold are statistically significant at 0.05 level.

5.3.3. CONCLUSIONS

In order to answer the second research question, *i.e.* whether schools differ in respect of their social outcomes, four binary dependent variables were considered. Students were asked about their degree of satisfaction in the areas of: (a) vocational orientation, (b) ethnic and religious minorities, (c) sexually transmitted diseases, and (d) drug taking. Statistically significant differences between schools were found only in the areas of 'vocational orientation' and 'sexually transmitted diseases'. Further analysis showed that a girl and a student whose father is a *leitourgos* (a highly respected professional in the public or state sector) has had less chance of being satisfied with the discussions that take place in their schools in the area of 'vocational orientation'. The differences between schools in the area of 'sexually transmitted diseases' remain unexplained. What also remains unexplained is the residual school-level variance in the area of 'vocational orientation'.

5.4. ANSWERING THE THIRD RESEARCH QUESTION: CONSISTENCY OF SCHOOL EFFECTS

5.4.1. SCHOOL EFFECTS ACROSS DIFFERENT ACADEMIC OUTCOMES

The third research question asks if schools have been equally effective in the final year for different academic outcomes and students with different characteristics. In order to investigate if schools are equally effective, four different academic outcomes have been selected for study: (a) Religion (Greek Orthodox Catechism), (b) Greek Language, (c) Mathematics, and (d) Science. The selection of these General Education subjects was deliberate. Mathematics and Science are two subjects frequently researched in the context of international evaluation studies. Religion and Greek Language are considered strong components in the syllabus of the Greek integrated *lyceum*. According to Kassotakis (2000) 'Greek history, tradition, culture, Orthodox Religion and modern Greek Language ... are considered essential components of the Greek national identity and will also have to be accomplished through education' (p. 185).

In order to answer the third research question new models have been used, more complex than the ones which were described in Section 5.2. The new models are necessary because the ones which have been used up to now are not appropriate for making multiple comparisons between different school outcomes or students with different characteristics. What constrains the comparing power of the models in Section 5.2 is the problem of 'capitalisation on chance', *i.e.* the probability of – incorrectly – finding differences due only to the large number comparisons. For example if we compare the coefficient for the dummy variable 'girl' across the columns of Table 5.21, we might find some differences between the columns but we are not sure that these differences are 'real'.

The solution to the problem of capitalising on chance is the construction of multivariate multilevel models which are appropriate for multiple comparisons. Two such models have been constructed for the needs of the third research question of the current study. The first model refers to the population of schools and has been named 'Model P_{mv}^{year}'. The basis of construction of Model P_{mv}^{year} was Model P^{AB}. The second multivariate model

refers to Sample B and the basis of its construction was Model B^A. It has therefore been called 'Model B^A_{mv}'. The fixed parts of Models P^{year}_{mv} and B^A_{mv} are presented in Table 5.27 and Table 5.30 respectively.

A number of points need to be clarified as regards Model P^{year}_{mv} and Model B^A_{mv}. Contrary to what is the case in the models of Section 5.2, Models P^{year}_{mv} and B^A_{mv} do not refer to many school outcomes but to one. Thus, it is suggested that an imaginary outcome exist, which combines achievement in Religion, Greek Language, Mathematics and Science. This imaginary outcome follows the multivariate normal distribution. Therefore, whilst Model P^{AB} is repeated on page 255 as many times as the subjects in the columns of Table 5.16, only a single Model P^{year}_{mv} exist. The notation of the coefficients in Models P^{year}_{mv} and B^A_{mv} is a little more complicated because it comprises three subscripts instead of two. The role of the first two subscripts is to indicate the position of the coefficient in the models. The role of the third subscript, the '*h*', is to indicate the name of the dependent variable: h = for Religion, h = 2 for Greek Language, $h = 3$ for Mathematics, and $h = 4$ for Science.

5.4.2. VALUE-ADDED MULTIVARIATE MULTILEVEL MODEL FOR THE POPULATION

The fixed part of the multivariate Model for the population P^{year}_{mv} is presented in Table 5.27. Model P^{year}_{mv} includes students' mean achievement in year 2 (the $\overline{B}$). Previous achievement has been included in the multilevel multivariate models because the focus of the current section is on the final year of *lyceum*. If we compare the fixed parts of Model P^{year} and Model P^{year}_{mv}, we will see that there are no significant differences in Religion, Greek Language, Science and Mathematics. In both models, the coefficient for 'girl' is negative for Science and Mathematics. This means that after controlling for the mean academic achievement in year 2, as well as for a number of other independent variables, the girls appear to have significantly lower grades than the boys in these two subjects. Significant differences between the two sexes are for the first time being measured in the Greek educational system. In Model P^{year}_{mv}, these differences are more clearly apparent because the coefficients are now directly comparable among the four

outcomes. The basis for this multiple comparison is the sign and the size of the coefficient γ_{10h} (girl) for the different values of h.

Table 5.27. Value added multivariate multilevel Model P_{mv}^{year}

	Religion (h=1)		**Greek Language (h=2)**	
Fixed part	Coefficient	S. E.	Coefficient	S. E.
γ_{00h} (intercept)	**0.076**	0.019	**0.123**	0.014
γ_{10h} (girl)	**0.188**	0.009	**0.265**	0.009
γ_{20h} (birth in 1981)	0.002	0.025	**-0.157**	0.023
γ_{40h} (birth in 1983)	0.014	0.010	**-0.026**	0.009
γ_{50h} (Technology Direction)	**-0.343**	0.011	**-0.463**	0.011
γ_{60h} (Sciences Direction)	**-0.241**	0.011	**-0.347**	0.010
γ_{70h} (mean grade in year 2)	**0.633**	0.005	**0.659**	0.004
γ_{01h} (private school)	0.021	0.043	0.024	0.030
γ_{02h} (school size 1)	**-0.077**	0.035	**-0.072**	0.025
γ_{03h} (school size 3)	0.044	0.029	0.018	0.019
	Mathematics (h=3)		**Science (h=4)**	
Fixed part	Coefficient	S. E.	Coefficient	S. E.
γ_{00h} (intercept)	**-0.315**	0.012	**-0.284**	0.013
γ_{10h} (girl)	**-0.105**	0.008	**-0.076**	0.007
γ_{20h} (birth in 1981)	**-0.137**	0.021	**-0.127**	0.019
γ_{40h} (birth in 1983)	**0.027**	0.008	0.009	0.008
γ_{50h} (Technology Direction)	**0.514**	0.010	**0.408**	0.009
γ_{60h} (Sciences Direction)	**0.660**	0.009	**0.623**	0.008
γ_{70h} (mean grade in year 2)	**0.667**	0.004	**0.695**	0.004
γ_{01h} (private school)	**0.097**	0.025	**0.114**	0.027
γ_{02h} (school size 1)	**-0.062**	0.021	**-0.066**	0.022
γ_{03h} (school size 3)	0.026	0.016	0.024	0.018

-2 loglikelihood (IGLS) =194835.100 (112,460 of 122,292cases in use).
Effects marked in bold are statistically significant at 0.05 level.

By studying the coefficients in Table 5.27 we can see that the strongest predictor of academic achievement is previous achievement in year 2 (the $\overline{B}$). Because $\overline{B}$ and the four examined outcomes are in standardised form, the coefficients of $\overline{B}$ are also correlation coefficients. The next stronger predictor for the four outcomes is Direction of studies. The base category in Model P_{mv}^{year} is the Humanities Direction. It is clear that

boys and students from the Technology and Sciences Direction have better grades for Science and Mathematics and lower grades for Religion and Greek Language. Another finding is that on average the students of the private schools achieve higher grades than the students of state schools. The benefit of being student in a private school is larger in Science (coefficient =0.117) and smaller in Religion where the coefficient is effectively equal to zero. Being a student in a small school (less than 50 participants in the examinations) is a disadvantage for all the four outcomes of Model P_{mv}^{year}. On the other hand, the coefficients for the large schools (over 101 participants) are not different from zero.

Differences between the sexes and Direction of studies acquire a special meaning in the case of Orthodox Religion (h=1). Religion in Greek schools is taught by clergymen. The educational objective of the subject is to catechise the students in the values of the Greek Orthodox Church. Other groups' values are not presented in the classrooms and different theologies are regarded as inferior to that of the Greek Orthodox. Religion is the only outcome in Model P_{mv}^{year} for which the coefficient for the variable 'born before 1982' is not statistically significant. However, differences have been found for Religion between the two sexes, the Directions of Studies and the size of the schools. There are two possible explanations for these differences: either girls who follow the Humanities Direction in large schools are more knowledgeable than the boys who follow the other two Directions in small schools or Religion has much in common with subjects in which similar patterns of achievement appear. The second explanation is much more plausible. The importance of this conclusion in educational policy will be a matter of discussion in the sixth chapter of the current work. The relation between the subjects is more clearly presented in the two following tables. Table 5.28 presents the residual covariance matrix of the four subjects at school level. The numbers in the diagonal are the variances whereas the numbers off the diagonal represent the covariance between the items. The numbers in the parentheses are standard errors and the numbers in bold are correlation coefficients. The same notation has been used in Table 5.29, which presents the residual covariance and correlation coefficients at student level.

Table 5.28. Residual between school covariance (375 schools).

	Religion		Greek Language		Mathematics		Science	
	0.049	(0.004)						
Religion	**1**							
	0.010	(0.002)	0.020	(0.002)				
Greek Lang.	**0.317**		**1**					
	0.004	(0.002)	0.005	(0.001)	0.013	(0.001)		
Mathematics	**0.168**		**0.338**		**1**			
	0.004	(0.002)	0.004	(0.001)	0.008	(0.001)	0.017	(0.002)
Science	**0.138**		**0.214**		**0.537**		**1**	

Note: All values are statistically significant at 0.05 level. Values in bold are Pearson's correlation coefficients.

Table 5.29. Residual within school covariance (375 schools).

	Religion		Greek Language		Mathematics		Science	
	0.459	(0.004)						
Religion	**1**							
	0.152	(0.003)	0.415	(0.004)				
Greek Lang.	**0.348**		**1**					
	0.065	(0.002)	0.065	(0.002)	0.332	(0.003)		
Mathematics	**0.167**		**0.175**		**1**			
	0.081	(0.002)	0.070	(0.002)	0.155	(0.002)	0.288	(0.002)
Science	**0.224**		**0.204**		**0.503**		**1**	

All values are statistically significant at 0.05 level.
Values in bold are Pearson's correlation coefficients.

By observing the structure of covariance at school and student level, it can be concluded that at both levels there is strong correlation between Science and Mathematics. The smallest correlation coefficient at school-level is between Religion and Science whereas the smallest correlation coefficient at student-level is between Religion and Mathematics. Within schools, Greek Language correlates in only a small degree with Mathematics. Between schools, however, Mathematics and Greek Language are medially correlated. The general picture is that within schools there is a fair correlation between Mathematics and Science on the one hand, and Religion and Greek Language on the other. At the school level, however, Greek Language correlates fairly both with Religion and with the pair of Mathematics and Science. Students' prior achievement in Model P_{mv}^{year} is not random at school level as in Model P^{AB} and therefore the intra-school correlation coefficient (ρ) can be computed. The ρ coefficient is 0.096 for Religion, 0.046 for Greek Language, 0.038 for Mathematics and 0.046 for Science. In a recent

study, Huber (1999) has argued that achievement in Mathematics is rather unaffected by school level processes. The current study has partially confirmed this finding.

5.4.3. Multivariate multilevel models for Sample B

Apart from Model P_{mv}^{year}, Model B_{mv}^{A} was constructed in order to investigate the joint effects of other explanatory variables available only for Sample B. Model B_{mv}^{A} was constructed on the basis of Model B^{A} The fixed coefficients of Model B_{mv}^{A} are presented in Table 5.30 that follows.

Table 5.30. Coefficients for the multivariate multilevel Model B^{A}_{mv}.

	Religion (h=1)		Greek Language (h=2)	
Fixed part	Coefficient	S. E.	Coefficient	S. E.
γ_{00h} (intercept)	**-0.274**	0.100	**-0.227**	0.096
γ_{10h} (girl)	**0.199**	0.060	**0.278**	0.058
γ_{20h} (birth in 1981)	**-0.439**	0.162	**-0.575**	0.156
γ_{40h} (birth in 1983)	-0.016	0.065	-0.037	0.063
γ_{50h} (Technology Direction)	**-0.491**	0.072	**-0.668**	0.070
γ_{60h} (Sciences Direction)	**0.218**	0.069	0.090	0.066
γ_{70h} (father professional)	0.116	0.076	**0.206**	0.073
γ_{80h} (mother with university degree	**0.257**	0.060	**0.343**	0.057
γ_{90h} (*Frontisterion* attendance)	0.117	0.070	0.084	0.068
γ_{100h} (home tuition)	0.039	0.062	-0.003	0.060
γ_{110h} (computer at home)	0.079	0.055	0.094	0.053
	Mathematics (h=3)		**Science (h=4)**	
Fixed part	Coefficient	S. E.	Coefficient	S. E.
γ_{00h} (intercept)	**-0.696**	0.086	**-0.615**	0.087
γ_{10h} (girl)	-0.073	0.054	-0.065	0.054
γ_{20h} (birth in 1981)	**-0.626**	0.146	**-0.601**	0.147
γ_{40h} (birth in 1983)	-0.065	0.059	-0.059	0.059
γ_{50h} (Technology Direction)	**0.313**	0.064	**0.206**	0.065
γ_{60h} (Sciences Direction)	**1.041**	0.061	**1.006**	0.062
γ_{70h} (father professional)	**0.176**	0.068	**0.162**	0.069
γ_{80h} (mother with university degree	**0.338**	0.054	**0.277**	0.054
γ_{90h} (*Frontisterion* attendance)	**0.138**	0.063	**0.138**	0.063
γ_{100h} (home tuition)	0.093	0.056	0.086	0.056
γ_{110h} (computer at home)	**0.132**	0.049	**0.128**	0.050

-2 loglikelihood (IGLS) = 9191.049 (4601 of 13,528 cases in use)
Effects in bold are statistically significant at 0.05 level.

If we compare the fixed coefficients of Model B^{A}_{mv} with the coefficients of Model B^{A} (see Table 5.21), we find no large differences. A comparison between Model P^{year}_{mv} and Model B^{A}_{mv} however, yields some differences. More specifically, the students that were born before 1982 have lower grades in all the four outcomes of Model B^{A}_{mv} but not in

Religion in Model P_{mv}^{year}. Also, girls have significantly negative coefficients in Mathematics and Science in Model P_{mv}^{year} but in Model B_{mv}^{A} the corresponding coefficients are essentially equal to zero (their confidence intervals for 0.05 level include 0). The higher coefficient for 'girls' in Model B_{mv}^{A} is in the case of Religion. As regards the differences between the two sexes, the most reliable model must be Model P_{mv}^{year}, simply because it represents the population. Model B_{mv}^{A} may fail to falsify the null hypothesis H_0 (*i.e.* that there is no difference between the two sexes) but this can be a result of the model's power[1].

The students of Sample B who follow the Technology and Sciences Direction have lower grades in Religion and Greek Language and higher grades in Mathematics and Science in both Models P_{mv}^{year} and B_{mv}^{A}. Another important set of coefficients in Model B_{mv}^{A} is 'mother with university degree'. The coefficient is positive and significant in all four dependent variables of in Model B_{mv}^{A}. Its largest value is in the case of Greek Language. The students with a father who is a functionary (high SES) achieve better grades in all the examined subjects of Table 5.30 except for Religion. Having access to a computer at home has a positive effect which, however, is significant only for Science and Mathematics. The effect of private tuition is essentially equal to zero. *Frontisterion* attendance is significant for Mathematics and Science.

Table 5.31. Residual between school covariance (39 schools).

	Religion		Greek Language		Mathematics		Science	
	0.051*	(0.018)						
Religion	**1***							
	0.021	(0.014)	0.048*	(0.017)				
Greek Lang.	**0.430**		**1***					
	0.009	(0.010)	0.026*	(0.011)	0.018*	(0.009)		
Mathematics	**0.294**		**0.900***		**1***			
	0.008	(0.010)	0.023*	(0.011)	0.009	(0.008)	0.022*	(0.010)
Science	**0.229**		**0.715***		**0.436**		**1***	

Values in bold are Pearson's correlation coefficients.
* values that are statistically significant at 0.05 level.

[1] The power of a statistical test is the probability of correctly rejecting the null hypothesis.

Table 5.32. Residual within school covariance (39 schools).

	Religion	Greek Language	Mathematics	Science
	0.783 (0.033)			
Religion	**1**			
	0.487 (0.027)	0.725 (0.031)		
Greek Lang.	**0.646**	**1**		
	0.402 (0.024)	0.403 (0.024)	0.645 (0.027)	
Mathematics	**0.565**	**0.589**	**1**	
	0.423 (0.025)	0.418 (0.024)	0.493 (0.024)	0.654 (0.028)
Science	**0.592**	**0.608**	**0.760**	**1**

Values in bold are Pearson's correlation coefficients.
All values that are statistically significant at 0.05 level.

Table 5.32, shows the within schools covariance for the dependent variables of Model B^{A}_{mv}. All the four subjects seem to be medially to highly correlated. Any particular structure is not evident. The results however are different in Table 5.31, which shows that there is no strong correlation between Greek Language and Mathematics at school-level. By contrast, at the same level there is a fairly strong correlation between Greek Language and Science and a moderate correlation between Mathematics and Science and Religion and Greek Language.

The main conclusion of the multilevel multivariate analysis is that the 375 *lyceia* of the population are consistently effective in Religion, Greek Language, Mathematics and Science. The school-level correlation coefficients for these four subjects are all statistically significant. The size of the coefficients ranges from only 0.138 in the case of Science and Religion and up to 0.537 in the case of Mathematics and Science.

5.5. ANSWERING THE FOURTH RESEARCH QUESTION: ACADEMIC ACHIEVEMENT AND TEACHERS' RESPONSIVENESS

5.5.1. ACADEMIC ACHIEVEMENT AND SCHOOL PROCESSES

The fourth research question asks what are the most important school processes and policies which are associated with effectiveness in the final year of the Greek *lyceum*. Attempting to answer this research question is very complex. The literature of school effectiveness research has shown that no study has ever exhaustively investigated all the effective school processes and policies. In the current researcher's opinion, the main reasons why no perfect study of such a kind will ever be conducted are both theoretical and methodological. From a theoretical point of view it is well known among teachers and educators that no single theory of instruction or school organisation has ever been suggested. From a methodological point of view, the factors which may affect teaching and learning are myriad and, in addition, even a small change in one of them may affect the others in an unpredictable way. However, relationships which link processes with outcomes have been recognised in a large number of studies within the tradition of school effectiveness research. In the current study only students' views on 'teacher responsiveness' was selected as an explanatory variable in multilevel analysis.

5.5.2. ACADEMIC ACHIEVEMENT AND TEACHER RESPONSIVENESS

The relationship between school processes and students' academic achievement was studied with the help of the Factors which were presented in Section 4.3.7.2. More specifically, all Factors from Table 4.18 and a Factor from Table 4.16 were used as explanatory variables in multilevel models. These new multilevel models were given the generic name 'Model C' because they were exclusively constructed for Sample C. The five teacher Factors which were tested in the new multilevel models were: (a) 'effectiveness of the school's director', (b) 'teachers' self-regulation', (c) 'teachers' collegiality', (d) 'teachers' satisfaction with their profession', and (e) 'teachers' keenness'. The four student Factors were: (a) 'teacher responsiveness', (b) 'neatness of the school environment', (c) 'academic self-image', and (d) 'rivalry among students'.

The impact of the fixed coefficient for each one of the five teacher-generated Factors with students' achievement was essentially equal to zero. This means that 'teachers' self-regulation', 'collegiality', 'satisfaction', and 'keenness' appear to have no significant effects on students' achievement for this sample. This is an unexpected finding. There are two possible explanations for it. The first explanation is that the finding is correct and there is essentially no relationship between teachers' Factors and students' academic outcomes. The second explanation is that relationships between the explanatory Factors and the outcomes do exist but the constraints of the sample size and the weaknesses of this phase of the research made it impossible to identify any real effects. This is a problem of statistical power. However, apart from the power of the models, there are a number of weaknesses as regards the current phase of the research that must be recognised. Firstly, the teachers who participated in this phase of the study were not all the teachers of the 33 schools of Sample C (see Section 4.3.4). The selection of the participants was something which had to be done by the researcher. Greek *lyceia* are governed 'democratically' by their teachers. The role of the director is simply to keep his or her fellow teachers informed about the decisions of the Ministry. However, inside this apparently power-free environment, strong interpersonal relationships are built up that are based on psychological, social and political ties. The small number of staff in Greek schools – about 20 teachers – makes it very difficult for any researcher to conduct any other type of research apart from an ethnographic one. Any quantitative study which uses questionnaires as research tools cannot enter teachers' interpersonal relationships without a significant danger of 'non-response' or – even worse – false response. This issue will be discussed in greater detail in the next chapter. The only Factor that has been found to correlate significantly and positively with students' progress is the 'teacher responsiveness', as reported from the students' perspective. The components of this Factor have been presented in Table 4.16. The fixed coefficients of 'teacher responsiveness' are presented in bold in Table 5.33 that follows.

Table 5.33. Fixed coefficients and random part of value added Model C^{P}_{year} (33 schools).

	Lyceum Certif.		Religion		Greek Language		History		Science		Biology	
	Coeff.	S.E.	Coeff.	S.E.	Coeff.	S.E.	Coeff.	S.E.	Coeff.	S.E.	Coeff.	S.E.
Fixed part												
γ_{00} (intercept)	**0.103**	(0.044)	0.024	(0.067)	**0.116**	(0.054)	**0.241**	(0.059)	**-0.189**	(0.046)	-0.034	(0.054)
γ_{10} (girl)	**-0.106**	(0.036)	**0.140**	(0.052)	**0.183**	(0.045)	**-0.152**	(0.048)	**-0.155**	(0.040)	**-0.113**	(0.044)
γ_{20} (born in 1981)	**-0.308**	(0.104)	-0.116	(0.148)	-0.039	(0.128)	**-0.630**	(0.139)	-0.136	(0.116)	-0.220	(0.127)
γ_{30} (Techn. Direction)	-0.043	(0.045)	**-0.217**	(0.064)	**-0.398**	(0.055)	**-0.273**	(0.060)	**0.427**	(0.049)	0.070	(0.054)
γ_{40} (Sciences Direction)	-0.016	(0.043)	**-0.144**	(0.062)	**-0.332**	(0.053)	**-0.241**	(0.058)	**0.574**	(0.048)	**0.290b**	(0.053)
γ_{50} mean achiev. year 2	**0.821**	(0.018)	**0.622**	(0.025)	**0.685**	(0.022)	**0.700**	(0.023)	**0.681**	(0.019)	**0.693**	(0.021)
γ_{40} (teacher responsive-ness.)	**0.073**	(0.019)	0.047	(0.027)	0.041	(0.023)	**0.061**	(0.025)	0.051	(0.021)	**0.057**	(0.023)
Random part												
τ_0^2	**0.010**	(0.005)	**0.043**	(0.015)	0.017	(0.007)	**0.022**	(0.009)	0.006	(0.004)	**0.017**	(0.007)
σ^2	**0.243**	(0.011)	**0.466**	(0.022)	0.355	(0.017)	**0.414**	(0.020)	**0.291**	(0.014)	**0.346**	(0.016)
ρ	0.040		0.084		0.046		0.020		0.020		0.047	
-2 log likelihood	1316.4		1967.371		1704.864		1850927		1507.26		1682.641	
Number of cases	931		928		931		931		931		931	

Effects in bold are statistically significant at 0.05 level.

Table 5.33 Model C^{P}_{year} (continuing from the previous page).

	History of Science		Mathematics	
	Coeff.	S.E.	Coeff.	S.E.
Fixed part				
γ_{00} (intercept)	0.066	(0.055)	**-0.230**	(0.051)
γ_{10} (girl)	-0.052	(0.047)	**-0.169**	(0.043)
γ_{20} (born in 1981)	-0.034	(0.136)	**-0.281**	(0.122)
γ_{30} (Techn. Direction)	-0.061	(0.058)	**0.490**	(0.052)
γ_{40} (Sciences Direction)	0.002	(0.056)	**0.641**	(0.051)
γ_{50} mean achiev. year 2	**0.699**	(0.023)	**0.644**	(0.021)
γ_{40} (teacher responsive-ness)	**0.083**	(0.025)	**0.046**	(0.022)
Random part				
τ_0^2	0.011	(0.006)	**0.012**	(0.006)
σ^2	0.400	(0.019)	**0.323**	(0.015)
ρ	0.027		0.036	
-2 log likelihood	1808.166		1613.688	
Number of cases	931		931	

Effects in bold are statistically significant at 0.05 level.

Model C^{P}_{year} shows the fixed coefficient of the Factor 'teacher responsiveness' as γ_{40}. This Factor has been constructed from students' perceptions and is associated with: (a) the degree to which they found the classes to be interesting, (b) the degree to which students find teachers to be rewarding, (c) the friendliness of the teachers, (d) the frequency with which teachers help students to 'understand', (e) the degree to which teachers are interested in what their students say in the classroom, (f) the frequency of the feedback which is being given to students by teachers, (g) lack of teachers discriminations between students, and (h) the quality of communication between school and home. In conclusion, this aspect of the study draws attention to the importance of the classroom, particularly teacher behaviour as influences on students' academic outcomes. It also suggests that measures of school process derived from students' reports may be more useful than those derived from teacher-completed instruments.

5.6. CONCLUSIONS

The purpose of this chapter was (a) to present a collection of interesting statistics about the Greek educational system and (b) to investigate if schools make a difference in Greece, as has been found in a range of research studies in different studies and contexts. Twelve multilevel models of different degrees of complexity, 34 tables and 3 figures were used for the presentation of the results. The main finding is that schools make a difference also in Greece and that the school effect is fairly consistent across different subjects and students with different levels of initial achievement. This finding is something that Greek researchers and politicians would not found surprising. On the contrary, it is a rather common belief among Greek parents and students that in some state *lyceia* better 'educational work' is being conducted. A list with the 12 multilevel models that were used in the current study are presented below.

P^0: Variance component model for the population

P^{AB}: Personal characteristics and contextual model for the population

P^0_{year}: Prior achievement model for the population

P^{AB}_{year}: Personal characteristics, contextual, and prior achievement model (population)

P^{AB}_{bin}: Personal characteristics, contextual, and prior achievement model (population) for success in the certificate of integrated *lyceum*

P^{year}_{mv}: Multivariate, personal characteristics, contextual, and prior achievement model (population)

B^0: Variance components model for Sample B

B^A: Personal characteristics model for Sample B

B^{year}_{mv}: Multivariate personal characteristics and prior achievement model for Sample B

C^0_{bin}: Variance components model for binary outcomes (satisfaction – dissatisfaction) for Sample C

C^A_{bin}: Personal characteristics model for binary outcomes (satisfaction – dissatisfaction) for Sample C

C^P_{year}: Processes, personal characteristics and prior achievement model for Sample C

The 26 most important findings of the current study are:

1. The typical father for the sample of 39 schools in Attiki (Sample B) is a lower-grade professional in the services sector. The typical mother stays at home taking care of the children. Typically, both parents have finished a form of secondary education.
2. Parents in the prefecture of Attiki are on average better educated than those in the rest of the country.
3. About half the students (48%) of Sample B have access to a computer in their homes (S.E. 2,8%). This figure is higher than the OECD unweighted percentage of 40%.
4. Essentially, there are no computers in the Greek *lyceia*, except for administrational purposes. Thus it is meaningless to refer to the 'computer per student' ratio in Greek schools.
5. The teachers of Sample D are not satisfied with their salary and their living standards. However, they find teaching an exciting job and have good relationships with their colleagues and their school directors.
6. Students feel alienated in the schools. Almost half of the students in Sample C would change school if they had the chance. The main reasons for changing school are the condition of the building and the behaviour of some of the teachers. The climate in most of the schools is competitive: Many students are often rude to each other and many admit that sometimes they flatter their teachers in order to get higher grades.
7. Students are not satisfied with the information they receive in their schools about drugs, vocational orientation, life after school and ethic minorities.
8. The distributions of the examination results in the final year of *lyceum* are highly skewed. This fact reduces the discriminating power of the tests and damages the selection function of the national examinations.
9. More girls than boys take the national examinations. This difference is statistically significant at the 0.05 level. This finding needs to be explored in another study.
10. Differences between boys and girls were found in the three Directions of studies. Girls prefer the Humanities Direction whereas boys prefer the other two Directions Sciences and Technology.
11. Girls underachieve in Science and Mathematics but outperform boys in Greek Language and Greek Orthodox Religion. This finding is consistent with the outcomes of PISA 2000 study for Greece (see OECD, 2001). Again, more research is needed regarding this issue.

12. The size of the school effect in the present study varies according to the model which was used. The intra-school correlation coefficient in the 'empty' model P^0 for the population of 375 schools in Attiki is around 0.10. This figure is much smaller than the intra-school correlation coefficient which was found in the 'empty' model of the PISA 2000 study (0.504). In Models P^{AB} and B^A the average intra-school correlation coefficients are 0.075 and 0.038 respectively. In Model P^{AB}_{year}, the intra-school correlation coefficient varies with students' initial achievement in the second year of *lyceum* and is between 0.02 and 0.09. The small school effect can be explained from the fact that in the current study normalised and not raw scores of students examination results were used. The discrepancy between the findings of PISA 2000 and the findings of the current study can also be attributed to: (a) the different educational level on which these two studies have focused; (b) to the fact that the tests which were used in the current study were content-specific, whereas the test of PISA 2000 were not; and (c) the fact that the population of schools in the current work was more homogeneous than the population of the PISA 2000 study.

13. Schools are not differentially effective for students with different initial achievement levels (with the reservation that the measures or prior achievement used were only over a one-year period).

14. Schools are generally consistently effective across different academic outcomes.

15. Students who either have repeated one year underachieve in the national examinations. This finding is consistent with the findings of the PISA 2000 study (see OECD, 2001).

16. Students who have followed the Sciences Direction have on average significantly higher achievement in their *lyceum* certificate. The choice of Direction also provides a crude indicator of prior achievement also because more able students tend to opt for the Sciences Direction.

17. Students who studied in large schools have on average significantly higher grades in their *lyceum* certificate. Again, this finding is consistent with the findings of the PISA 2000 study (see OECD, 2001).

18. Students who studied in private schools have on average significantly higher grades in their *lyceum* certificate (consistent with the results of the PISA 2000).

19. Students with a highly educated mother and a 'functionary' father have on average better achievement.

20. Almost 80% of the students attend a *frontisterion* and 30% receive private tutoring at home. Eighteen percent of the students attend both forms of parallel education. Only 9.8% of the students have no experience of the Greek 'shadow education' system of *parapaedeia*.

21. Participation in the 'shadow education' system (*frontisterio* and *idiaitero*) is associated with mother holding a university degree and father being a professional (*leitourgos*).

22. The *frontisterion* is an important factor in educational achievement in Greece, especially in Science and Mathematics. If we combine this fact with the skewed distributions of the raw examination results, we can conclude that access to *frontisterion* can essentially determine to a large degree a student's educational and occupational future. This is a very important finding because it demonstrates a kind of educational inequality which is little evident in other developed countries.

23. Having access to a computer at home is something that correlates positively and significantly with (a) father being a professional, (b) mother holding a university degree and (c) educational achievement.

24. The study shows that teacher responsiveness – as measured by student perceptions – has a positive impact on school achievement in all subjects. This is an important finding which suggests that aspects of teacher quality may be generic rather than subject-specific in the context of the Greek *lyceum*.

25. Roughly, the same variables which 'explain' students' achievement 'explain' also success and failure in obtaining a *lyceum* certificate (a categorical variable).

26. Bayesian estimates for the mean student achievement in the *lyceum* certificate with comparative confidence intervals at a given level of statistical significance can be used for visually examining the differences in school outcomes.

6. DISCUSSION: EVALUATING EDUCATIONAL WORK IN GREEK *LYCEIA* USING SETS OF INDICATORS

"The requirement to publish examination results inevitably involves the risk of institutional damage. However, if such data are not made available it is possible that schools will not be aware of their current performance in relation to other schools, and therefore there will be less pressure for improvement of current practices. (...) We conclude that the determining factor should be the right or parents to have the most useful information".

Goldstein & Myers (1996) Freedom of information: towards a code of ethics in performance indicators. *Research Intelligence*, 57, p. 3.

6.1. FOUR QUESTIONS ABOUT THE FUTURE OF EDUCATIONAL EVALUATION IN GREECE

In the previous chapter, the current researcher attempted to answer four research questions which dealt with the particularities of school effectiveness research in Greece, as well as the size and structure of the '*lyceum* effect'. In the first chapter of the current study, these four research questions were associated with two theoretical issues: (a) the construction of a model of *lyceum* effectiveness model and (b) the case of educational evaluation and school based review in Greece. This thesis is not about educational policy but about educational effectiveness and evaluation. However, the lack of a given political and administrative framework for educational evaluation in Greece would made any relevant educational discussion unstable. Thus, before attempting to discuss the two theoretical issues that were mentioned above, it would be worth putting forward a number of questions about the future of educational evaluation in Greece. Thus, the different answers to the four questions that are presented below could represent an equal number of possible policy scenarios. The four questions are:

1. Will the myth of 'educational work' ever be dispelled?
2. Will a 'curriculum for self-evaluation ever been written?
3. Will there be a new law for educational evaluation?
4. What will be the role of the media, and especially the quality newspapers in educational evaluation?

The answers to these questions will be given below.

6.1.1. WILL THE MYTH OF 'EDUCATIONAL WORK' EVER BE DISPELLED?

The first question deals with the future of 'educational work', a term which according to the current author is a well-preserved myth among teachers. As it was described in Section 2.4.4, Greek teachers have proposed a model for school self-evaluation based on staff meetings. In the early 1980s teachers reacted against their evaluation and proposed instead the evaluation of their 'educational work'. Since then, teachers' proposals have roughly remained the same and can be found in their own official

publications (see, for example, OLME's bulletins in 1995, 1997, and 1998). In brief, teachers propose two evaluation meetings, the first at the beginning of the school year and the second at the end of the school year. In the first meeting teachers are supposed to design their 'educational work'. In the second meeting teachers will evaluate the degree to which their targets – set in the first meeting – have been achieved. School consultants and a number of educational administrators are supposed to be kept informed about the minutes of the meetings but without having any right to interfere in the actual procedure of evaluation. In teachers' proposals, the targets, the methods and the context of evaluation are not prescribed by educational administrators in the upper levels but are left to be 'democratically' decided by the teachers of each school separately.

The current researcher has strong reservations about teachers' proposal because, in his opinion, such an evaluation could never be implemented in Greek schools. If this kind of evaluation were feasible, the teachers themselves would have piloted it in the last twenty years. This however has never been the case. In the current researcher's opinion, evaluation is not so simple a task that it could be discussed in just two staff meetings. Evaluation presupposes training, experience and a minimum degree of knowledge of literature and other people's work. Moreover, educational evaluation presupposes clear – though not necessarily incontestable – ideas of what is worth fighting for in our schools. As was mentioned in Section 2.1, the Greek educational system is extremely politicised and usually every governmental shift means a change in the educational administrators at prefectural municipal, and school (neighbourhood) level. Thus, most probably, the evaluating discussions of the teachers will in fact become political debates over the scope and the role of education in modern societies.

A second serious disadvantage in teachers' proposals is the lack of the 'accountability' aspect. One of the purposes of educational evaluation is to inform the people outside the teaching and learning transaction about the quality of the system in which this transaction takes place. Of course, evaluation can be 'formative', aiming at the improvement of educational processes, and of course in many cases the results of evaluations are for internal information and action and not for dissemination. However, every evaluation has a summative part, however small this part may be. In current researcher's opinion, the 'self-evaluation of educational work' proposed by Greek teachers has never been anything more than a successful myth of Greek trade unionism. Like Homer's *Odyssey*, the myth about the 'self-evaluation of educational work' is

being related again and again in teachers' unions and its variants are also published from time to time in educational journals and newspapers. However, there are signs that teachers do not believe in this myth anymore. The conclusion of current researcher's personal communication with teachers who are very high up in the hierarchy of the two teachers unions (OLME and DOE) is that in all probability the myth of educational work will finally be dispelled.

6.1.2. WILL A 'CURRICULUM FOR SELF-EVALUATION' EVER BE WRITTEN?

A very interesting case of failure as regards the issue of educational evaluation in Greece is the proposal of the Greek Pedagogical Institute (PI). The model of the Greek PI was based on the tradition of educational action-research of the 1980s. According to this tradition, teachers can act as researchers in their own schools (for a review of these views, see Bollen & Hopkins, 1987; Hopkins, 1987 and 1988). The basic idea behind the model of PI was that the teachers of each school would be provided with written guidelines and special supportive material in order to be able to evaluate their schools. For this purpose, the Pedagogical Institute published in 1999 the book *Internal Evaluation and Planning of Educational Work* (in Greek), prompting teachers to see it as a 'curriculum for self-evaluation' (p. 90). What was included in this volume was a rough description of qualitative and quantitative research techniques for data collection and analysis that were supposed to be taken up by the teachers in each school separately. The information that would be gathered by means of questionnaires, interviews, observation, and even photographs, would help teachers to improve their schools, reorganise their pedagogy and even enhance their interpersonal relations. The proposal of the Greek Pedagogical Institute failed and was finally abandoned by its own designers. The failure was important because the people who worked on this proposal were teachers on secondment at the Greek Pedagogical Institute who tried to distance themselves from the myth that was presented in the previous section.

There are various reasons behind the failure of the Greek Pedagogical Institute's proposal. An internal account of these reasons was given by Bofilatos (2000), who had participated in the PI's project. The author concluded that the reasons for the failure were of two kinds: political and circumstantial. From a political point of view, Bofilatos argued that the Greek Ministry of Education turned down the work that was painstakingly conducted in the Pedagogical Institute by issuing a number of circulars

which prescribed educational evaluation. From a 'circumstantial' point of view, Bofilatos claimed that the take-overs of the schools by their students between November 1998 and January 1999 made the teachers of four of the five participating pilot schools to withdrawn from the project.

Bofilatos' (2000) views can be understood and they are justifiable to a degree. However, the current researcher believes that there were more serious reasons for the failure of Institute's programme. First, there seems to have been no adequate communication between the Department of Evaluation of the Pedagogical Institute and the Ministry of Education although the former is an advisory body to the latter. Secondly, five participating schools is a very small number for an externally funded study. This unfortunate fact must be seen in relation to the lack of an alternative plan in case that something went wrong. What 'went wrong' was the students' take over of their schools. With four out of the five participating schools withdrawn from the Institute's programme, the programme was bound to fail. A third reason for the failure of the programme was that the guidelines that were given to teachers were ambiguous. In the phase of data collection the *Internal Evaluation and Planning of Educational Work* (Pedagogical Institute, 1999) adopted a constructivistic view either by allowing teachers to decide what information they should collect or by presenting large lists of effectiveness-enhancing variables but without presenting a theory that would join the pieces of the puzzle. Current researcher believes that there should be a clearer theory and a much more thorough review of other research findings in the PI's guidelines (1999).

Another reason for failure was the motivation of the teachers who worked on the programme. Unlike other evaluation programmes that kept on running, despite severe shortages of funds – like the A-Level Information System in the United Kingdom – the funds that were coming from the European Union seemed to be a crucial factor for teachers' participation in the programme of the Greek Pedagogical Institute. Characteristically, when technical papers for funding were not approved by the auditors of the Operational Educational and Initial Vocational Training Programme (see Section 2.3), the participants and some of the persons in the support team of the Pedagogical Institute withdrew. As Bofilatos (2000) admits:

> The delay in the approval of the technical papers for the second year of the programme's implementation as well as the delay in the approval of the technical papers for the third year gave to the

> steering committee, the support team and the teachers in the schools a feeling of insecurity and, in some cases, a feeling of defeat (Bofilatos, 2000: 173, current author's translation).

In conclusion, the proposal of the Greek Pedagogical Institute was an ambitious plan for school self-evaluation and review by means of action research. The plan was designed to help schools to evaluate themselves by providing self-evaluation survival kits. However, according to Hopkins & Lagerweij (1996), the empirical support for the utility of the school based review with the form of 'action research' was criticised even in the 1980s of being 'ambivalent'. The people that worked in the Evaluation Department of the Greek Pedagogical Institute could have succeeded in their work if (a) they had not been so attached to a relativistic 'bottom-up' approach, (b) had prepared a consistency plan in order to deal with students' reactions that traditionally become evident every November, (c) had been less dependent on teachers' circumstantial attitudes, (d) had had a theory, or at least a more concrete idea about the factors that have an impact on the quality of education, and (e) had a grasp of the multilevel character of educational data. Thus, concerning the question of the current section *i.e.* whether a curriculum for school self-evaluation will ever be written in Greece, the answer must be negative. The proposal of the Greek Pedagogical Institute failed and there is no reason to believe that a second chance will be given by the government.

6.1.3. Will there be a new law for educational evaluation in Greece?

Over the last three years, the Greek Ministry of Education has repeatedly attempted to introduce educational evaluation. For example, the 8th article of Education Law 2525 introduced the *Soma Monimon Axiologiton,* (Body of Permanent Evaluators) for education. These evaluators would be responsible for evaluating schools using questionnaires, interviews and regular visits. This Body, however, was never established. Another attempt at evaluation was the Ministry's Circular Γ2/4791 of 1998, according to which Greek teachers should be appraised by their school director, the deputy director and a special evaluation committee in their school. According to Circular Γ2/4791, teachers were to be assessed in two fields: (a) the degree of their pedagogical competence and (b) the quality of their personal contribution to the work that is being conducted at school. So far, no such reports have been written.

The new education Minister, Mr. Petros (Peter) Efthimiou, has been designing new procedures for educational evaluation. In a draft of bill named 'organisation of primary and secondary local educational authorities, in-service training and appraisal of teachers, evaluation of educational work, and other provisions' the Minister describes the new procedures for educational evaluation. According to the fourth article of the draft bill, the evaluation of schools is jointly assigned to the Pedagogical Institute and the Centre for Educational Research. The fifth article of the draft outlines new procedures for teachers' appraisal. According to these procedures, it is planned that teachers should be appraised on a voluntarily basis by means of self-written reports. Non-voluntary evaluations will be carried out in cases where teachers are applying for administrative posts within the system. Obligatory evaluation applies also in cases where teachers already hold such administrative posts (for example, school consultants or school directors). In these cases, personnel evaluation will take a pyramid-like form in which the upper administrative levels evaluate the lower administrative levels by means of reports.

One characteristic that differentiates the policy of the Greek Ministry of Education from the proposals of teachers and the proposals of the Pedagogical Institute is the Ministry's interest in the appraisal of education personnel rather than the evaluation of 'educational work'. The interest of the Ministry is not unjustifiable. According to Webster (1995), school evaluation programmes must be co-ordinated with teacher appraisal. From this point of view, the model of the Greek Pedagogical Institute and the model of the Greek Ministry of Education are different as regards teacher appraisal. The Greek Ministry of Education sees teacher appraisal in a way similar to Scriven's (1995) 'inspector model'. What, however, will be the future of these new procedures for evaluation if the draft finally becomes law? The answer to this question is not easy. The new bill will be discussed in February of 2001. Many things will depend on the final form of the law, the quality of work in the Greek Pedagogical Institute and the Centre for Educational Research, as well as teachers' reactions.

6.1.4. What will be the role of the Greek quality newspapers?

In some countries, and especially in the United Kingdom and France, quality newspapers systematically publish the results of public examinations in order to inform parents about differences between schools. The information that is published in four

quality British newspapers has been investigated by West & Pennell (2000) and presented by current researcher in Table 6.1. What will be the situation in Greece in a few years time? The answer is that Greek quality newspapers will probably continue to publish examination results irrespectively of the educational policy and the reaction of teachers. As regards the question about what outcomes will actually the newspapers publish, it is worth to study Table 6.1 in order to see what information is being published by British newspapers.

Table 6.1. GCSE examination indicators used by four quality daily newspapers in the United Kingdom in 1998 (from West & Pennell, 2000).

The Guardian
- Percentage of 15 year-olds achieving 5 or more grades A*-C
- Percentage of 15 year-olds achieving 1 or more grades A*-G
- Average GCSE score
- School progress measure
- Number of pupils within the school with special needs both with and without 'statements'
- Total number of students (all ages)

The Independent
- Number of students aged 15
- Average GCSE score
- Percentage of students achieving 5 or more GCSE grades A*-C
- Percentage of students achieving 5 or more GCSE grades A*-C in 1995
- School progress measure
- Percentage of students with half days missed through unauthorised absence (Truancy)

The Times
- Number of students aged 15
- Average GCSE point score
- Percentage of students achieving 1 or more grades A*-G
- Percentage of students achieving 5 or more grades A*-C
- Percentage of students achieving 5 or more grades A*-C in 1996
- Percentage of students achieving 5 or more grades A*-C in 1997
- Percentage of students with half days missed through unauthorised absence (Truancy)

The Daily Telegraph
- Percentage of students achieving 5 or more grades A*-C
- School progress measure

The role of Greek quality newspapers is expected to be important in the future, as regards the publication of information about the quality of the Greek educational system. In the academic year 1998-1999, Greek *lyceum* students were examined in 14 common subjects. This gave journalists and researchers the opportunity to publish the names of the 'best' and 'worst' *lyceia* in the country, judging by the mean achievement of the students who studied at them but taking no account of intake. The first such list appeared in the Greek daily *Eleftherotypia* on 4 of August 1999 (see Mastoras, 1999).

Currently, George Panaretos, a professor at the University of Economics in Athens, gave the newspapers details about the 40 most 'effective' and the 40 most 'ineffective' integrated *lyceia* in Greece. Panaretos' analysis was in every national newspaper on 25 of July 2001. One conservative newspaper, *Apogevmatini*, made Panaretos' findings its main headline on the front page. The reporter's comment on the difference between private and public schools was that this difference 'proves the failure of the new system' – meaning 'the failure of the socialist government in the field of education'.

The criteria of effectiveness in Panaretos' study were the percentages of students' achievement within four different intervals: (a) a grade lower than 15, (b) a grade from 15 to 19, (d) a grade higher than 19, and (c) failure in obtaining a certificate of the integrated *lyceum*. The characteristics that were studied by Panaretos and his colleagues at the University of Economics were exclusively at school level. Neither student background variables nor school compositional characteristics were taken into account. It was found that the 'best' schools were the large and private ones. It is worth noting however, that just a few days before the day on which Panaretos' analysis was published in all the national newspapers, the current author published a small part of his multivariate multilevel results. Thus on 11 of July 2001 the Greek quality newspaper *To Vima*, published the first 'value added' examination results in Greece (see Triga, 2001).

In addition to the publication of examination results, Greek newspapers are expected to play a significant role in formulating people's opinions about the quality of education offered in Greece. For example, good private Greek *lyceia*, like 'Ekpaideftiria Douka' and 'Scholes Moraïti' have published advertisements which inform their prospective 'clients' that a high percentage of their students have been accepted in prestigious universities. The closer this percentage is to 100%, the better a school is esteemed. This however was not the normal practice two years ago. Other educational characteristics of good private *lyceia*, things, for example, that have to do with students' values and attitudes are ignored. The possibility that strong sociological or compositional factors have affected the percentage of students' success is never considered. In conclusion, Greek quality newspapers have already begun to play a very significant role in shaping people's opinion about schools and education in general. This phenomenon will most probably intensify in the future.

6.2. A MODEL FOR THE EFFECTIVENESS OF THE GREEK INTEGRATED *LYCEUM*

At first sight, the construction of a model of *lyceum* effectiveness seems simple. As has become evident from Chapter 5, Greek *lyceia* seem to make a difference regarding their effectiveness. Thus, a list with the most promising effectiveness-enhancing conditions identified in the previous chapter could be constructed. The contents of this list could then be easily transformed into an integrated model of *lyceum* effectiveness, in which the correlates of students' outcomes would be connected with arrows and lines in an impressive conceptual map. However, how useful the construction of yet another school effectiveness model in the literature would be? The answer is 'not very useful', unless this model contained a number of characteristics not found in other studies. Figure 6.1 attempts a systemic approach to the Greek educational system. What makes this approach different is the existence of the 'shadow education' (*parapaedeia*) box below the formal educational system.

As argued in subsection 2.1.3, *parapaedeia* can be viewed as the 'guilty secret' of the Greek educational system. In the current researcher's opinion, Greek *parapaedeia* represents a network of vested interests that is supposed to compensate for the inefficiencies of the normal schools but, in practice, it only increases the likelihood that students with disadvantaged backgrounds will 'fail' in terms of their chances of continuing in higher education. Over the years, the parasite of *parapaedeia* has created its own mechanisms and strategies for survival. The statistical analysis of the current work (see Section 5.1.7) revealed that 78.5% of the students attend *frontisterion* whereas 21.5% of students are taking *idiaitera* (private lessons at home). Official data for the cost of *frontisteria* and *idiaitera* do not exist, both because there are no mechanisms for the collection of such data and also because *frontisteria* and private lessons are not always legal. However, some unofficial courses, like those for journalists and certain political parties, estimate the fees for *frontisteria* to total around 34,0425,532 Euro per annum. To this amount one must add another 500,366,838 Euro for *frontisteria* in foreign languages. Finally, according to the same unofficial sources, the annual cost of *idiaitera* totals 731,914,838 Euro (Lakasas, 2001a).

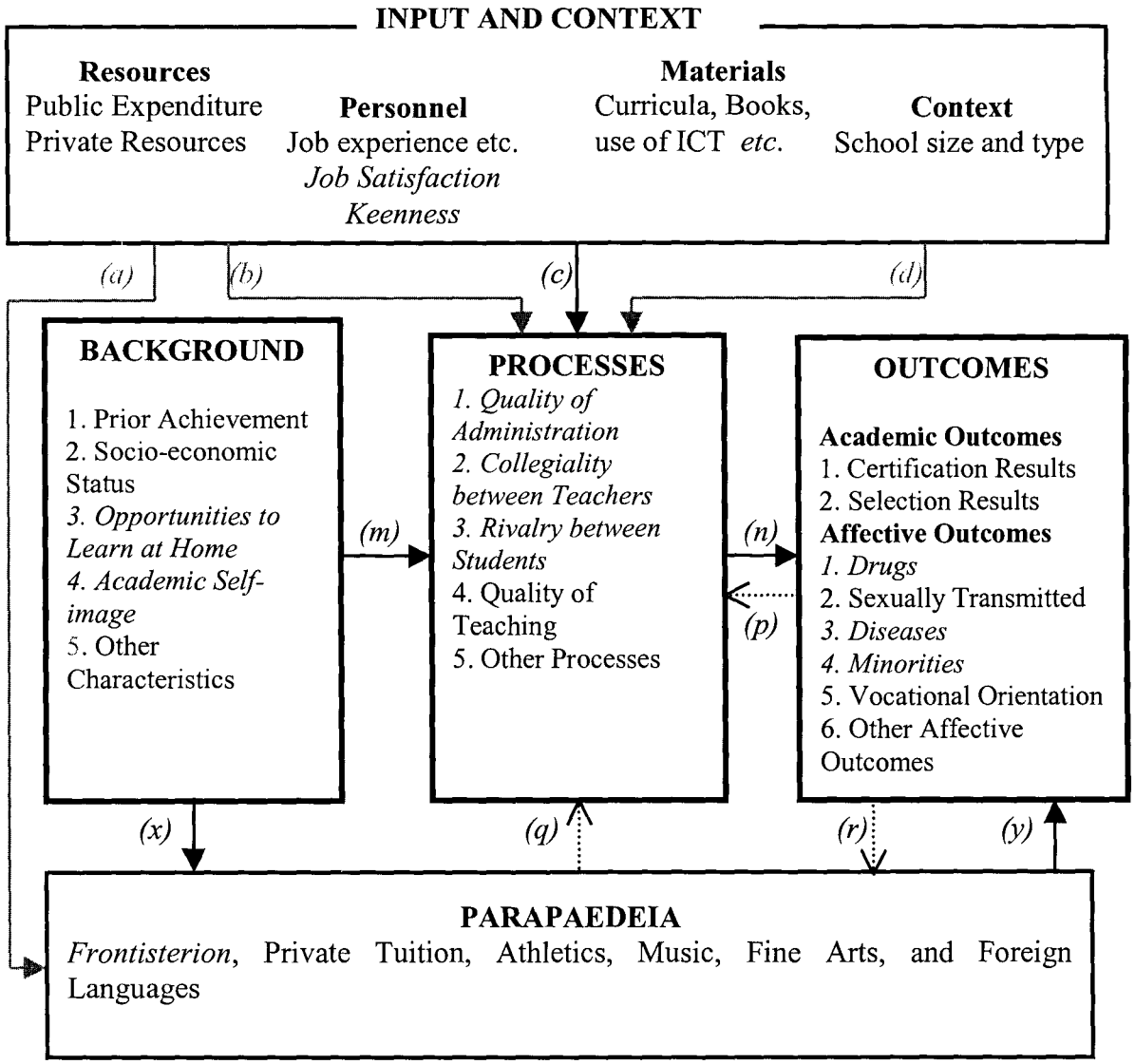

Figure 6.1. A systemic approach to the effectiveness of Greek higher secondary schools (integrated *lyceia*).

A successful strategy on the part of *frontisteria* operators (owners and teachers) is to advertise themselves as the 'helpers' for under-achieving Greek students. An example of the strategy of *frontisteria* at the policy level is the case of September's examinations. In an effort to diminish the role of *frontisteria*, former Minister of Education abolished the 'second chance' public examinations that used to take place every September for those students who failed in the normal public examinations in June. Recently, however, the 'second chance' examinations of September were partially reintroduced by the current Minister. In a statement made by the Minister of Education

on 31st of July 2001, September examinations came back because, as the Minister explained: 'for both educational and social reasons, an educational system should avoid at all costs the exclusion of students and support their attainment'. However, given the fact that Greek schools close from June to September, *frontisteria* are the only source of teaching during the summer. Thus, some Greek students are expected to learn in *frontisteria* what they should have learned in their school during the whole school year. But *frontisteria* are profit-making organisations. The knowledge that they offer to Greek students is linearly dependent on families' income. In that sense, Greek *frontisteria* produce the worst type of educational inequality ever: a 'hidden' but nevertheless 'necessary' inequality that is officially fuelled. Upon this, Professor Michael Kassotakis, one of the main designers of the latest educational reform in Greece, wrote in Sunday's *Kathimerini* (17th of July 2001) that:

> The appeal to educational and social reasons occurred in order to cover up the practical reasons which they imposed, the deference to pressures from different groups and the satisfaction of sectional claims (Kassotakis, 2001: 17).

The situation that was described in the previous paragraph has to change if Greece is ever to improve the quality of its educational system. If a 'second chance' is to be given to those secondary school students whose level of achievement in June is low, policy makers have to make sure that this 'chance' is being offered by the schools themselves and not by *frontisteria*. A 'second chance' that depends on the family's income is not a chance at all. In current author's opinion, such a policy deeply insults the image of the Greek educational system in the eyes of teachers, students and parents. After all, Greek people pay their taxes in order to enjoy an effective and just educational system. In the current study, some elementary statistical models showed that attendance at *frontisteria* raises the chances of success, especially in subjects where procedural and not declarative knowledge is being pursued (such as Mathematics and Science). Future research has to open the 'black box' of *parapaedeia* in Greece whereas future educational policy has to eliminate the parasite of *parapaedeia* forever.

The left-hand box in the model of Figure 6.1 contains a list with students' background characteristics. These characteristics can be found in the international literature to have a very important effect on the school outcomes irrespective of the processes in the school or the classroom. In the current study, the strong effect of a family's socio-economic status and previous achievement over a one year period was confirmed. The

outcomes in the right-hand box of Figure 6.1 are of two kinds: academic and social. The formers include two types of examination results: results for certification and results for selection. Only the certification results were available in the current study (whether a student succeeded in obtaining his or her certificate of integrated *lyceum*). The selection function of the examinations was not accessible because the special weights by which students' scores are multiplied were unknown (see page 63 of the current thesis). As regards affective outcomes, they were students' self-reported level of satisfaction on four distinct areas: drugs, sexually transmitted diseases, vocational orientation and minorities.

The processes that were studied in the present work (see middle box of Figure 6.1) were only at school-organisational level as the concern of the thesis was not the investigation of the teaching and learning transaction. In the history of School Effectiveness the study of variables at school level has preceded the study of variables at lower levels (e.g. at instruction- or teacher-level). Thus the current work can be seen as the basis on which other school effectiveness studies will emerge in Greece and which will take into consideration variables at classroom or teacher level. The possible associations between classroom-level effectiveness-enhancing conditions and school-level effectiveness-enhancing conditions have been presented in Section 3.5.1. The fact that 'quality of instruction' was found to correlate significantly with academic outcomes is an important indicator that more work needs to be done in this field. It is interesting that students' perceptions of quality of instruction show a strong relationship across all different subjects even after other factors are controlled in the models. This suggests that factors taps significant aspects of teaching which may be seen as generic rather than subject specific.

In order to construct a model of effectiveness for the Greek integrated *lyceum*, the author used the systemic approach as presented in Figure 6.1. A model that is commensurate with a systemic approach of school effectiveness is the Integrated Model of School Effectiveness, proposed by Scheerens in 1990 (see Figure 3.4). The model of Scheerens (1990) could be reconfigured to include a number of Greek specific factors of educational effectiveness. Thus, a model for the effectiveness of the Greek *integrated lyceum* could appear as in the model in Figure 6.2.

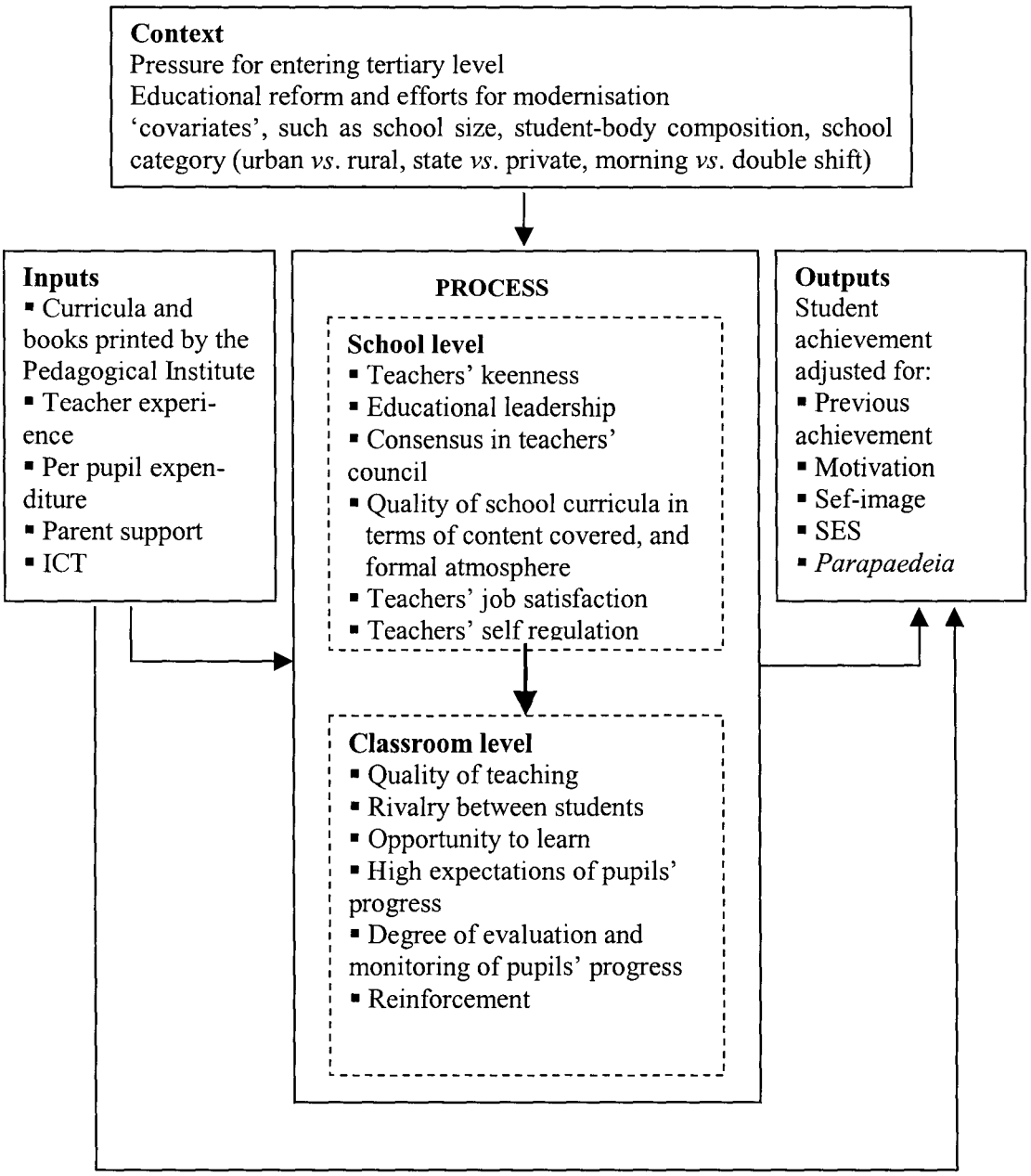

Figure 6.2. A model for the effectiveness of the Greek *lyceum*, based on Scheerens' (1990) 'integrated model of school effectiveness'.

6.3. QUALITY INDICATORS IN EDUCATION

6.3.1. THE COMPLEXITY OF EDUCATIONAL SYSTEMS

Figure 6.1 presented a simple model of the Greek educational system. However, educational systems are extremely complex or, from a mathematical point of view, 'chaotic'. Chaotic systems, like the weather or the earthquakes, are not linear or predictable. This not only because the number of the governing variables in such systems is enormous but also because the behaviour of these systems is sensitive even to the smaller change in the initial conditions. As Davies (1987) writes in his famous book *The Cosmic Blueprint*, 'a minor disturbance [in chaotic systems] such as the flapping of a butterfly's wings could cause a major disturbance in the weather such as a hurricane' (p. 52). Perhaps, complexity explains why meteorologist have difficulties in making long-term weather forecasts and why policy makers find it hard to make long-term plans for educational change.

The complexity of a school system as regards its effectiveness has been partially presented in the current work in Sections 3.5.1, 3.6.2, and 3.6.3. In Section 3.5.1 a number of 'alternative' models demonstrated how complex the relations between school-, classroom- and student-level effectiveness correlates could be. Sections 3.6.2 and 3.6.3 dealt with the complexities in the consistency and stability of the school effect. In order to discuss the implications that chaos theory has for education, Fitz-Gibbon refers to the book *Complexity: the Emerging Science on the Edge of Order and Chaos* (Waldrop, 1992) and makes analogies between chaotic systems and the educational system. Fitz-Gibbon (1996) lists the following four characteristics of complex organisations:

- *unpredictability* – the impossibility of prediction under some circumstances;
- *feedback* – the flow of information and consequences from the environment in which a complex organism is surviving;
- *local organisation* as opposed to central control;
- *emergence* – the spontaneous development of diverse and effective organisations in conditions which border on chaos. (Waldrop, 1992; cited in Fitz-Gibbon, 1996: 38).

The first of the above-presented points implies that educational systems are unpredictable. In the *New Meaning of Educational Change*, Fullan (1991) presents five reasons for this unpredictability: (a) the existence of multiple and sometimes competing goals, (b) the distribution or power, (c) the process for arriving at solutions that satisfy a number of constituencies, (d) the influence of the society and (e) the variety of situationally appropriate ways of teaching. According to Fullan (*op. cit.*), wishing for, waiting for, and urging the educational system to become more rational is in itself irrational.

In conclusion, linear planning cycles in education like 'set priorities, set targets, plan, implement, and evaluate' do not always work. Fullan's (1991) arguments have been illustrated in the Greek context. In the second chapter of the current work the reasons why the Greek educational system is said to be under the ancient curse of Sisyphus were described. At that point, it was argued that the history of the modernisation of the system has been a history of consecutive small-scale catastrophes. As regards 'feedback', the second of the points that were presented in the previous paragraph, Fitz-Gibbon notes that if feedback strongly affects the development of complex organisations, then the nature of that feedback must be of utmost concern.

6.3.2. THE MEANING OF INDICATORS IN EDUCATION

The model for the effectiveness of the Greek integrated *lyceum* in Figure 6.2 is based on a systemic approach to the Greek school system that was presented in Figure 6.1. The contents of the boxes both in Figure 6.1 and Figure 6.2 are entities that from a statistical point of view are called 'variables', 'correlates', or 'factors'. These variables can be found in the statistical literature together with defining epithets like 'dependent', 'independent', 'explanatory', 'latent' and so on. From a theoretical point of view, however, the variables in the boxes of Figure 6.1 and Figure 6.2 may also be called 'indicators'. Thus, educational indicators are 'individual or composite statistics that relate to basic constructs in education and are useful in a policy context', (Shavelson *et al.*, 1989: 5). From the definition of Shavelson *et al.* (1989), it is evident that not every educational statistic can be classified as indicator. Indeed, as Nuttal (1992) points out:

> To be an indicator, an education statistic must also have a reference point against which it can be judged. Usually the reference point is some socially agreed-upon standard (e.g., a minimum reading age to indicate basic literacy), a past value (*e.g.*, the 1970 level of

> mathematical attainment), or a comparison across schools, regions or nations. Obviously, indicators do not tell everything about education systems. Instead, like economic or health indicators, they provide an 'at a glance' profile of current conditions' (Nuttal, 1992: 14).

Today, there is international interest about educational indicators. Four networks of indicators exist around the world, all set up by the Organisation for Economic Cooperation and Development (OECD). The purpose of these networks is presented in Table 6.2.

Table 6.2. The four OECD networks for educational indicators (from Fitz-Gibbon & Kochan, 2000: 270).

	Leading Nation	Task
Network A	United States	Student learning outcomes
Network B	Sweden	Education and labour market destinations
Network C	The Netherlands	Schools and school processes
Network D	United Kingdom (Scotland)	Expectations and attitudes to education of the various stakeholder groups in OECD countries

Apart from the OECD publications on educational indicators (e.g. the annually published *Education at a Glance*), a number of educational experts have published books and articles on educational indicators, educational standards, and the issue of monitoring the quality of educational systems. Two of these experts are Bottani & Tuijnman (1994), who in the book *Monitoring the Standards of Education* present the basic characteristics of education indicators as follows:

> 1. Indicators are *quantitative*, but they are more than simply a numerical expression or a composite statistic;
>
> 2. Indicators are intended to convey *summary information* about an important aspect of the functioning or performance of the economy or an education system;
>
> 3. Indicators are intended to *enlighten and inform* the stakeholders and other interested parties. In the case of education, the stakeholders range from the students and their parents, teachers and school principals, school inspectors, local administrators, employers, and of course politicians and decision–makers in government agencies;
>
> 4. Indicators are intended as *diagnostic tools*, as a basis for evaluation, and for creating new visions and expectations;

5. Ideally indicators should be *part of a larger set* that includes pointers suggesting how the indicators might be interrelated. Although an indicator alone can be informative, value added can be achieved if knowledge about the relationships among the various economic and education factors is available;

6. Indicators involve, or call for, *value judgements* and they are therefore intimately related to questions of policy. It is perhaps for this reason that indicators often attract much attention from the mass media the world over, precisely because they derive their meaning in a particular political context (Bottani & Tuijnman, 1994: 49, italics in the original).

Another expert in the areas of educational indicators and the 'science' – as she calls it – of monitoring educational systems is Fitz-Gibbon, who, as described in 2.4.2, is the driving force behind the 'A Level Information System' (ALIS) and the 'Year 11 Information System' (YELLIS) in the United Kingdom. Both ALIS and YELLIS are programmes for feedback of pupil-level data to schools. In 1996, Fitz-Gibbon (1996b) publicised the book *Monitoring Education*, in which she tried to bring together three distinct areas of inquiry. These areas are named in the subtitle of her book: 'indicators, quality and effectiveness'. In *Monitoring Education*, Fitz-Gibbon (1996) listed a number of criteria for the selection of educational indicators. These criteria were reviewed and presented four years later in the *International Handbook of School Effectiveness Research* (2000). The 12 criteria of Fitz-Gibbon are presented below.

1 Indicators need to refer to valued outcomes for managed units (classes, schools, local educational authorities etc).

2 Indicators relate to outcomes over which staff can reasonably be expected to have an influence. Indicators about aspects which schools feel unable to alter are not fair, though they may be of interest.

3 The major outcome indicators are contextualised otherwise, are neither fair nor interpretable.

4 Indicators are fed to the units of management – and they get back. In general, the smallest unit of management should receive all the data relevant to that unit.

5 Indicators are, and are perceived to be, fair.

6 Indicators are accessible. It is sometimes better to live with slightly larger errors of estimation than to use complex procedures which present barriers to understanding.

7 Indicators are explained (they do not need to be instantly understood).

8 Indicators are incorruptible.

9 Indicators are checkable

10 Indicators perceptibly improve as the unit improves its performance over time.

11 Behavioural implications of the indicators are beneficial.

12 Indicators are cost effective.

6.3.3. EXAMINATION RESULTS AS INDICATORS

In the right-hand box of Figure 6.1, we can see the phrase 'examination results'. Such results have traditionally been used in Greece, and also in some other countries, for drawing conclusions about the quality of education that is offered in schools. As was described in Section 2.1, the general feeling in Greek society is that the education offered in Greek schools is not of a good quality. For many years, Greek newspapers have based this view on the level of 'the bases'. The bases – *i.e.* the minimum grades for entering a Greek university – are always 'low' and therefore the 'standards' are said to be deteriorating. Referring to the examination results for June 2000, Lakasas (2001b), wrote recently that 'the bases are falling and the education is walking on a tight rope' (p. 3).

In the present thesis, examination results for June 2000 were also used in order to draw conclusions about the relative 'effectiveness' of a population of Greek higher secondary schools (*lyceia*). The questions that arise here are (a) how suitable are examination results as indicators of the quality of the system and (b) under what conditions could examination results provide information about educational standards. As Kellaghan (1996) asks in the fourth chapter of the World Bank's publication *National Assessments*, 'can public examinations be used to provide information for national assessment?' In order to answer this question it is important to clarify the different forms of examinations within an educational system.

6.3.3.1. Public examinations

Examinations, standardised achievement tests, educational indicators, and standards are issues usually discussed by many scholars who work in the area of educational

assessment. Most of the literature on these issues is anglophone, probably because in most non-English speaking countries, like France or Germany, the results of tests and public examinations are not used in debates about national educational 'standards'. A significant centre for the study of the above mentioned areas is the International Centre for Research on Assessment (ICRA) at the London Institute of Education. The director of this centre, Professor Alison Wolf, together with Professor Angela Little, are the editors of the book *Assessment in Transition: Learning, Monitoring and Selection in International Perspective* (1996), which approaches educational assessment from a comparative point of view. Thus, if we looked at the educational examination systems around the world with the help of *Assessment in Transition*, we would find that examinations can play three roles: either selection, or certification, or a combination of both.

Of the first two roles, selection is the most common function of educational assessment. In many countries, there is a form of public examination at the end of an official school stage, specially designed to select students for the higher educational stage (usually from the higher secondary school to the tertiary level). Such an examination is, for example, the Entrance Examination to Higher Education (EEHE) in The People's Republic of China. The aim of EEHE is to rank the candidates so that they can later be placed into prestigious or less prestigious universities. The certification function of public examinations can also be seen in a number of countries. For example, the French *baccalauréat* and the German *abitur* are issued to those students who posses a minimum set of criteria, usually linked to declarative and procedural knowledge that has been acquired in schools. Somerset (1996) compares selection examinations and certification examinations against six criteria. The results of this comparison are presented in Table 6.3.

Table 6.3. The two roles of public examinations.

	Selection	Certification
Access to subsequent opportunities	Access direct and usually rapid for successful candidates. Typically, opportunities offered by the recruiters: candidates do not actively seek them.	Access relatively indirect. Candidates must actively seek opportunities. Search often prolonged; may well be fruitless.
Range of subsequent opportunities	Generally only a single type of opportunity available; most often secondary school or university places.	Broader range of opportunities; likely to include employment or pre-service training.
Criteria for recruitment	Examination performance the main, often the sole criterion for recruitment.	Examination performance usually not the sole criterion for recruitment.
Certification	Examination authority may or may not issue a certificate. If it does, likely to be useful simply as a record of achievement (not as 'currency').	Authority issues a certificate indicating performance, which the candidate then uses as 'currency' in his or her search for opportunities. Value of certificate depends on grades.
Criteria for 'success' in examination	Narrow and clear-cut: gaining a place constitutes 'success'; not gaining a place constitutes 'failure'.	More ambiguous. Proportion who formally 'pass' often high, but candidates with lower-grade passes likely to regard themselves as failures if search for opportunities proves fruitless.
Control of examination	Recruiters usually. Influential university selection examinations sometimes run entirely by universities, with little or no input from other stakeholders.	Often a broader representation of stakeholder interests – especially the interests of those responsible for preparing candidates – than in control of selection examinations.

6.3.3.2. National assessments

In contrast to public examinations, national assessments are examinations conducted periodically at national level for evaluating the quality of the national educational systems (note that there are countries with more than one educational system). Kellaghan (1996) compares public examinations and national assessments in terms of purposes, achievement of interest, scoring and reporting, populations of interests, use of contextual information, and the importance of the examinations for students and teachers. The conclusions of this comparison are presented by the current author in Table 6.4.

Table 6.4. Public examinations and national assessments.

	Public Examinations	National Assessments
Purpose	To assess the performance of individual students.	To assess the performance of the whole educational system or part of it.
Achievement of interest	Many subjects, all in the cognitive (academic) domain.	Focus on core subjects which are common for all students but also on students' attitudes and aspirations, as well as other higher-order cognitive skills that might apply across a range of curricular areas.
Tests, Scoring, and Reporting	Relatively unstructured examinations, as they only need to accurately discriminate difference in students' achievement. Deviations from standardisation are generated from students' freedom to choose test items and individual judgement in marking. Extensive coverage of content is not required. Assessment is usually norm referenced.	Generalisability and comparability are important and therefore testing cannot tolerate the degree of non-structure that is often found in public examinations. Coverage of content is essential because what students do not know is also important. Usually, different samples of students are examined in different curriculum areas. Assessment is criterion referenced.
Populations of interest	Usually not held until the end of primary and secondary schooling.	Most national assessments test students during the course of primary school.
Contextual information	Contextual information could be collected. However, it would not be cost-effective to collect contextual and process information for all students taking public examinations.	Contextual information must be collected in order that a national assessment may provide policy makers with clues about why schools get the outcomes that they do.
High stakes and low stakes testing	High stakes: students' performance can have important consequences for their future educational and occupational options.	Usually low stakes. However, if the results are used to rank nations, districts, or schools in terms of performance, the examinations are of high stakes for teachers and policy makers.

Suitability for monitoring educational standards	Public examinations lack the basis for comparability because (a) examination populations change from year to year and (b) methods of scoring cannot be demonstrated to be sufficiently consistent over time. However, a public examination used for certification might be modified to provide adequate curriculum coverage, and thus to be used for educational evaluation, although this might have adverse effects on the public examination system by, for example, making examinations too long.	Item Response Theory is usually used for constructing comparable tests. National assessments are more expensive than public examinations. However, a representative sample of students is adequate and with the use of matrix sampling – in which a total test is divided into several components – comprehensive content coverage can be achieved.

6.3.4. CURRENT RESEARCHER'S PROPOSALS

The nature of public examinations and their two roles, the 'systemic' approach to the Greek educational system, the four policy scenarios that were presented in the Section 6.1, and the findings which were presented in the fifth chapter of the thesis are elements which give to the current researcher the opportunity to make a number of proposals. These proposals will be not very narrow because the current study has tapped many educational issues in Greece.

First proposition: Analyse appropriate academic outcomes.

The first proposition of the current researcher is associated with the previous section and concerns the nature of the academic outcomes that could be used as indicators for the Greek educational system. Section 6.3.3 dealt with different aspects of examination results. It was argued that results of public examinations are not always suitable for evaluating the quality of an educational system. As Kellaghan (1996) has demonstrated, public examinations differ from national assessment in seven important aspects: (a) purposes, (b) achievement of interest, (c) scoring and reporting, (d) populations of interests, (e) use of contextual information, and (f) the 'stakes' that are attached to them. However, as the same author (*op. cit.*) has stressed, public examination used for certification might be modified to provide adequate curriculum coverage and thus to be used for drawing conclusions about the quality of the system. Results of Greek public

examinations – preferably those serving certification purposes at the final year of integrated *lyceum* – could therefore be used as outcome indicators. The papers for these examinations should be curriculum-embedded and criterion-referenced. The large weight given to teachers' authentic assessments in the calculation of students' final grades should be drastically reduced to around 30% or even less. Moreover, it is essential that for each examined subject an item-bank to be constructed by subject-specialists who can be teachers on secondment at the Greek Pedagogical Institute or at the Centre for Educational Research. Greek teachers, parents and policy makers should also agree in a number of educational quality standards. Item Response Theory or other statistical methods could be used for dealing with errors in measurement and changes in the student body over time.

Second proposition: Collect and publish educational statistics at student and school level.

The second proposition of the current author is that educational evaluation cannot be achieved without basic statistics which must be published regularly and accurately. Information obtained from international sources, like the annual publications of OECD, may be useful for designing long-term educational policy at a national level but are not useful for improvement strategies at prefecture level. First, therefore, basic educational statistics should be collected either by the statistical department of the Greek Ministry of Education or the educational department of the National Statistical Service of Greece or the Centre for Educational Research. It is essential that educational statistics are published at national and regional level on a regular basis. It is really disheartening to learn that in the year 2002 the National Statistical Service of Greece can provide educational statistics only up to the year 1996. The current practice of channelling vital statistical information to some of 'our own' journalists, some of 'our own' educational researchers and some of 'our own' political friends is at least undemocratic. All teachers, all educational researchers, and all parents should have access to vital statistical information. Neither educational research nor educational policy can ever succeed in Greece without basic and detailed descriptive statistics.

Third proposition: Use appropriate affective outcomes.

The third proposition refers to the use of non-cognitive school outcomes for judging the effectiveness of schools. However, as the current study has underlined, the first step

should be for these outcomes to come into existence! It is therefore proposed that Greek integrated *lyceia* should offer education in values and social skills and not only in the cognitive domain. In other words, comprehensive Greek *lyceia* should educate also the hearts of the students and not just the minds. Students' answers to open-response questions (see page 245) indicated that the 17 year-olds who participated in the study felt alienated in their schools. The main reason for alienation, as some students stated, is the fact that the only thing that counts in school is academic achievement. The students in Greek comprehensive *lyceia* could work in teams, combining knowledge from different disciplines. Teamwork could then be graded by means of portfolio assessment. Greek teachers should not neglect the affective domain. Policy makers should not leave teachers without guidance in this difficult task.

If Greek students were encouraged to work on interdisciplinary small-scale projects, which would reflect their own interests and special abilities, significant work could be done in the affective domain. If subjects like music and fine arts were introduced to the National Curriculum, parents would not have to pay for them in private conservatories and 'shadow education' system. Music performance has to find a place in the National Curriculum and be taught in every school and not only in the state 'music *lyceia*'. The very existence of state music *lyceia* exclusively for the musically 'gifted' is based on the opinion that there are 'gifted' and not 'gifted' children as regards their music performance. This theory may or may not be correct. What is not correct, however, is to exclude students from music education on the basis of lack of 'talent'. Exclusions of this kind distort the very idea of comprehensive education in Greece.

Greek students should be given the opportunity to learn of other people's values and other peoples' religions. Since the Greek Constitution requires that schools should cultivate 'students' religiousness', it is essential that Greek students are taught about other religions and not just Greek Orthodox Christianity. The war against terrorism and organised crime, interpersonal relationships, as well as other contemporary ethical dilemmas could serve as starting points for the exploration of values in an open society. Affective school outcomes could be mainly measured qualitatively with interviews and ethnographical research but also quantitatively – to a certain degree – with the use of statistical models appropriate for latent variables based on questionnaires.

Fourth proposition: Focus on special educational problems at local level.

Another proposal of the current author deals with how the results of (appropriately conducted) public examinations could be used for the improvement of Greek schools. It was argued in Section 6.3.1 that from a philosophical point of view, linear logic should not be applied to chaotic systems like the weather, earthquakes and education. Experts in the area of educational change like Fullan (1991) appear to have arrived at the same conclusions. However, even in a complex educational system there are subsystems in which researchers can describe a problem, explore patterns, make statistical predictions, verify hypotheses, and build simple or more complex models in order to aid understanding it. An example is the finding that high socio-economic status is positively correlated with high academic achievement. The proposal of the current author is that a general systemic approach to the Greek school system would be unfruitful. Instead, evaluators and policy makers in Greece could work at a local level and focus on specific problems and aspects of the system, like, for example, the difference in achievement between boys and girls in Mathematics, Science and Religion, or the relation between *frontisterion* attendance and educational achievement. Teachers should be given information and feedback on issues like the ones that were presented above by school consultants or senior teachers who would know the local conditions of each area and who could define, measure and analyse educational quality indicators. Of course, this would require a certain degree of decentralisation which the Greek educational system currently lacks. However, special offices could be set up in the 108 local educational authorities of the country. These offices could employ by experienced teachers who could be specially trained for their new tasks.

6.4. EPILOGUE

This study has explored the effectiveness of a number of integrated *lyceia* in the greater area of Athens and has offered a possible solution to the problem of evaluating the 'educational work' in the Greek schools. It has been argued that the methods and the knowledge base of School Effectiveness Research could be the starting points for school-based evaluation and review in Greece. It has been recognised in the thesis that the impact of the school effect is small compared to the impact of the teachers and their classroom practices. It has also been recognised that quantification is not the only way of understanding what is going on in a school or a classroom. However, it is fair to argue that school level conditions facilitate classroom or teacher level conditions. Usually, good teachings takes place in good schools.

The Greek word for evaluation is *axiologisi* from *axia* (value) and *logos* (study). In the Greek educational discourse *axiologisi* is perceived to be a 'scientific', quantitative and multipurpose device that brings structure to an otherwise shapeless system. Other aspects of evaluation are very week to change this dominant view. No one, for example, believes that *axiologisi* could be truly 'constructivistic'. Even the 'liberal' – and in my view constructivistic – epistemological framework, which was proposed by the Greek Pedagogical Institute in 1999, included 'objective' and quantitative criteria for educational evaluation. Today there is no published material regarding educational evaluation in Greece but one can easily predict the shape of the things which are about to come. In all probability, a number of 'objective indicators' shall be constructed by those wise men and women who work at the Pedagogical Institute and the Centre for Educational Research. The existing – and of course untrained – administrative personnel, like school directors and school consultants, shall undertake the task of evaluating the teachers and the schools in an 'objective' manner. 'Objective' measuring scales shall also be used. The more detail that these scales include the better.

This view is something that the current researcher could not ignore. Greek society is thirsty for vital information about the quality of the educational system and the Greek newspapers publish uncritically whatever relevant information comes across. In the Greek educational departments of universities as well as in the congresses and the Greek educational journals, most academics in the field of education and didactics

discuss about the sociological, political and philosophical ramifications of evaluation. The opinion of the current researcher is that the main problem of educational evaluation in Greece is not the lack of fertile academic thinking. The problem of educational evaluation in Greece is mainly practical and methodological. Practical work is not as prestigious as critical thinking but on the other hand someone has to do it. In other words we need to start the evaluation first and think about the ramifications of evaluation in a later stage.

Many interesting objections could be raised against the current author's opinion as it was expressed in the previous paragraph. For example, one could argue that School Effectiveness Research offers a naïve and quantitative basis for educational evaluation. It could also be argued that the current work has been a study in policy making and not in the realm of educational evaluation. Both of these objections are reasonable and valid but also removable. Speaking about policy, not only does educational evaluation in Greece changes when there is a governmental shift, but also varies according to the personal views of different Ministers of education, even in the same government. Speaking about 'naïve evaluative research', not only are the names of the 40 'best' and the 40 'worst' *lyceia* (judged by their students' mean achievement) published in the Greek newspapers but also conclusions are being made about the 'excellent educational work' conducted in the private schools. Possible differences in schools' intake or individual differences in the socio-economic status of the students are not taken into account. The shadow education system of *parapaedeia* is not discussed openly as if one could disappear it by not mentioning it. However, *parapaedeia* exists and makes a difference to student achievement. Thus, no real evaluation can ever be made in the Greek educational system unless the thorny issue of *parapaedeia* has been taken into account.

Another objection against the current study could be its large size. One could reasonably argue that large studies are the work of national and international agencies. It could be argued that educational researchers ought to focus on small-scale educational research. Educators, in other words, are expected to illuminate the things that statisticians can only generally describe. Who else but the teacher-researcher can really understand an educational problem? Who else but the teacher-researcher can really improve the things in the school? The answer to this objection is that as far as evaluative research is concerned, there is no law which restricts teachers to small scale research only. In the third chapter of the current work we saw that educators have made large-scale

educational research in the past as regards the effectiveness of schools. Large organisation like the OECD and large international studies like PISA 2003 will inevitably 'push' educators in small-scale evaluative studies. However, educators do not have any reason to restrict themselves to the microcosm of the classroom, especially when there is a gap in the macro-level as happens in Greece.

This study has described the effectiveness of some Greek integrated *lyceia* with the use of multilevel models and this can be seen as an original contribution to the international community of educational effectiveness. These models investigated the size and structure of the school effect in Greece. The finding that Greek integrated *lyceia* differ both in their academic and affective outcomes is important but not unexpected. The investigation of the conditions and the factors that make Greek *lyceia* differ from each other is more important. The current researcher attempted to explore some of these factors within the context of a self-financed doctorate thesis. Many interesting things were found. The effect of attending a *frontisterion* is one of them. However, the most important contribution of the current study to the school effectiveness research community is the support for the idea that the way forward is not simply through more complex statistical analyses and large international studies. The way forward for the years to come passes through a study of the particularities of the context of each educational system, its history, tradition and local needs. The quest for school effectiveness can be better conducted at a local level. This is the only way in which school effectiveness will continue to be an interesting area of inquiry at an international level. School effectiveness research has just been born in Greece. Its future seems to be promising.

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7. Appendixes

7.1. CHAPTERS 2 AND 3

7.1.1. EDUCATIONAL LEVELS

Pre-primary education	ISCED O	Initial stage of organised instruction designed to introduce very young children to a school-type environment.
Primary Education	ISCED 1	Normally designed to give students a sound basic education in reading, writing and Mathematics.
Lower secondary education	ISCED 2	The lower secondary level of education generally continues the basic programme of the primary level, although teaching is typically more subject-focused often employing more specialised teachers who conduct classes in their field of specialisation.
Upper secondary	ISCED 3C	Programmes at level-3 not designed to lead directly to ISCED 5A or 5B. Therefore, these programmes lead directly to labour market, ISCED 4 programmes of other ISCED 3 programmes
	ISCED 3A	Programme at secondary level designed to provide direct access to ICSED 5A
	ISCED 3B	Programmes designed to provide direct access to tertiary programmes that focus on occupationally specific skills (tertiary type-B)
Post secondary non-tertiary	ISCED 4	These programmes straddle the boundaries between upper secondary and post-secondary education from an international perspective, even though they might clearly be considered as upper secondary or post-secondary programmes in a national context
Tertiary type B	ISCED 5B	Programmes that are generally more practical/technical/occupationally specific than ISCED 5A programme.
Tertiary type A	ISCED 5A	Programmes that are largely theoretically based and are intended to provide sufficient qualifications for gaining entry into advanced research programmes and professions with high skills required.
Tertiary type	ISCED 6	This level is reserved for tertiary programmes that lead to the award of an advanced research qualification. The programmes are devoted to advanced study and original research.

7.1.2. POINTS FOR UNIVERSITY ENTRANCE (JUNE 2001).

Grades	**weight**	**Points (for the 'excellent')**
Certificate of integrated lyceum	8	$20 \times 8 = 160$
First subject of the academic field	1.3	$20 \times 1.3 = 26$
Second subject of the academic field	0.7	$20 \times 0.7 = 14$
Total		200

7.2. CHAPTERS 4 AND 5

7.2.1. FACTORS IDENTIFIED IN THE PILOT STUDY

Factors derived from student questionnaire.

Factors	Factor Loadings	Variable	Description
F1: GOODN	.628	12	Going well
Academic self-	.408	14	Finishing homework
image	.595	21	'Contribution' in the classes
	.643	23	Going well (teachers' view)
	.670	28	Relative achievement
	.489	8	Asking for help
	.484	9	Usefulness of homework
F2: TCARE	.672	20	Teachers helping
(teachers	.516	22	Teachers 'listening'
support)			
	.703	27	Teachers supporting
F3: SCHST	.502	1	Liking school
(School status)	.605	3	Going well with teachers
	.427	5	Teacher are fair
	.359	6	Clean playground
	.421	18	Interesting work at school
	-0.433	33	Truancy
	.453	37	Behaving well to teachers
F4: HBEH	.776	38	Behaviour at home (student's view)
Home behaviour	.810	39	Behaviour at home (parents' view)
F5: HCARE	.450	11	Parents caring
Parents caring	.732	13	Discussing with parents
F6: OTHST	.597	2	Going well with other students
Harmonic	.605	3	Going well with teachers
relationships with	.275	34	Other students' behaviour in the school
others	.329	36	Personal behaviour to other students
F7: EASYW	-0.418	16	Perceived difficulty of homework
Easiness of work	.335	19	Easiness of work at school
at school and at	.481	24	Easiness or work
home			
F8: SLFIM	.434	7	Teachers praising
Self efficacy	.359	17	Feeling self confident
(perceived)	.419	29	Self efficacy (perceived)
	.410	30	Feeling clever

F9: FRIEN	-0.430	32	Feeling 'out of things'
Friendships	.459	35	Making friends easily
F10:HELP	-0.145	15	Teachers checking own homework
	.552	31	A 'good' personality in the classes
F11	.215	25	Teachers advising 'thinking for yourself'
	.281	40	Teachers counselling

Factors derived from teachers' questionnaire

Factors	Factor loading	Variable	Description
G1: SOLID	.545	18	Collegial care for the problems of the school as a whole
(friendly atmosphere and collaboration)	.719	19	Co-operative effort in educational and administrational issues.
	.634	20	Systematic information of the new staff
	.729	21	Usefulness of the regular official discussions between the teachers
	.524	22	Advice from other colleagues about teaching and dealing with difficulties.
	.591	23	Discussions between the staff often tap important teaching and learning issues.
	.764	24	The benefit of the whole school is above teachers' personal persuasions.
	.661	25	Everybody accepts the others with their pros and cons.
	.718	26	In the regular official meetings, teachers usually agree.
	.605	27	You can count on most staff members to help out anywhere, anytime - even though it may not be part of their official assignment.
	.629	28	Most of my colleagues share my beliefs and values about what the central mission of the school should be.
	.689	30	This school seems like a big family; everyone is so close and cordial.
	.821	31	The administration 'knows its job'.
G2: EFFED (perceived Directors' effectiveness)	.755	32	The administration knows what king of school wants and communicates it to the staff.
	.729	33	The administration lets staff members know what is expected from them.
	.370	34	Administration's effectiveness in securing extra recourses for the school
	.528	35	Administration's effectiveness in dealing with persons and situation that interfere with teachers' work

Factors derived from teachers' questionnaire (continued).

Factors	Factor loading	Variable	Description
	.721	39	Satisfaction with the job
G3: EFFES			
(perceived self	.485	40	Offering a proper (right) type of education
effectiveness)	.655	41	Enjoying teaching this year
	-0.453	42	Teaching is a waste of time
	.648	43	Perceived self effectiveness in teaching
G4: SREGU	.624	9	Deciding on the teaching material
(Self-	.774	10	Choosing teaching methods
regulation)			
	.497	11	Keeping the discipline in the class
	.580	12	Deciding the quantity of the homework
G5: SUPPD	.706	36	Director's support in everyday work
Director's	.796	37	Direction's understanding of personal problems
support	.357	38	Director being easily approachable
G6: JBSAT	.581	44	Satisfaction with the compensation
Job satisfaction	.619	45	Personal satisfaction of teaching
	.349	46	Satisfaction of life as a teacher
G7: DFBEH	.718	15	Student's behaviour interfering with teaching
(Behavioural	.746	16	Student's co-operation interfering with teaching
difficulties	.416	17	Percent of students' for
G8: EAZYW	*.325*	*22*	Advice from other colleagues about teaching and dealing with difficulties.
(Easiness of work)	*.448*	*27*	You can count on most staff members to help out anywhere, anytime - even though it may not be part of their official assignment.
G9	.423	14	Students' attitudes brought from 'outside' reduce their chances for future academic success
G10	*-0.283*	*28*	Most of my colleagues share my beliefs and values about what the central mission of the school should be.

7.2.2. THE FORMULA FOR CRONBACH'S *ALPHA* COEFFICIENT

$$r_{kk} = \frac{k}{1-k}\left(1 - \sum \sigma^2 \sqrt{\sigma_y^2}\right)$$

where r_{kk} = coefficient alpha;
k = the number of items in the test;
$\sum \sigma_i^2$ = the sum of item variances;
σ_y^2 = the variance of the test.

7.2.3. THE FORMULA FOR DIRECT OBLIMIN

$$D = \sum_{j=k=1}^{r}\left[\sum_{i=1}^{n} b_{ij}^2 b_{ik}^2 - d\left(\sum_{i=1}^{n} b_{ij}^2 \sum_{i=1}^{n} b_{ik}^2\right)/n\right]$$

where r is the number of columns in a pattern matrix, b_{ij} is the factor loading of variable i on factor j and n is the sample size.

7.2.4. THE FORMULA FOR THE χ^2 STATISTIC

The formula of the χ^2 statistic for the fit of the model in the method of *least squares* is given by Kim & Mueller (1978):

$$U_k = N\{\ln|\mathbf{C}| - \ln|\mathbf{R}| + tr(\mathbf{RC}^{-1}) - n\}$$

where,
k = the number of extracted Factors in Factor Analysis;
ln = natural logarithm, and tr = trace of a matrix;
N = the sample size;
n = number of variables;
R = the covariance matrix;
C = $FF' + U^2$, where
F = Factor loadings and $\mathbf{U}^2$ = unique variance

The associated degrees of freedom are given by $df_k = 1/2\left[(n-k)^2 - (n+k)\right]$,Where k is the number of hypothetical factors and n is the number of variables. The df_k is not affected by the sample size N.

7.2.5. THE MEASURE OF SAMPLING ADEQUACY IN FACTOR ANALYSIS

$$\text{MSA} = \frac{\sum\sum_{j\neq k} r_{jk}^2}{\sum\sum_{j\neq k} r_{jk}^2 + \sum\sum_{j\neq k} q_{ik}^2}$$

where r_{jk} is an original correlation and q_{jk} is an element of the anti-image correlation matrix. The anti-image correlation matrix is the matrix of the partial correlations among variables after factor analysis, or the degree to which the factors 'explain' each other in the results. The diagonal of this matrix contains the measures of sampling adequacy for each variable, and the off diagonal values are partial correlations among variables (Hair

et al., 1995). In matrix algebra the anti-image correlation matrix is given by $Q=SR^{-1}$, where R^{-1} is an inverse of the correlation matrix and $S=(\text{diag } R^{-1})$ (Kim & Mueller, 1978).

7.2.6. The regression method for scales construction in Factor Analysis

The formula for the regression method for the construction of scales in Factor Analysis is $\hat{\mathbf{F}} = \mathbf{X}(\mathbf{B}'\mathbf{R}^{-1})$, where, $\hat{\mathbf{F}}$ is the Factor scale, **B** is the matrix of Factor loadings, the Xs are the observed variables, and **R** is the correlation matrix for the Xs.

7.2.7. Adjusted residuals in chi square test

In a two-way contingency table, the adjusted residual for the cell ij has the form $\frac{n_{ij} - \hat{\mu}_{ij}}{\sqrt{\hat{\mu}_{ij}(1-p_{i+})(1-p_{+j})}}$ (Agresti, 1996: 31) where,

n_{ij} is the observed frequency in the cell,

$\hat{\mu}_{ij}$ is the estimated expected frequency assuming independence

p_{i+} and p_{+j} are the sample marginal distributions (the raw and column totals).

7.2.8. Bayesian estimates in multilevel modelling

Consider a simple linear model with no explanatory variables: $Y_{ij} = \beta_{0j} + R_{ij}$. In multilevel analysis, this model takes the form $Y_{ij} = \gamma_{00} + U_{0j} + R_{ij}$, where U_{0j} and R_{ij} are the school- and student-level error respectively. Information gathered from student level involves the estimation of γ_{00}, whereas information gathered from school level involves the estimation of β_{0j}. Snijders & Bosker (1999: 58) explain that in multilevel analysis the estimation of β_{0j} is equivalent with the estimation of U_{0j} because if we know γ_{00} and U_{0j}, we also know β_{0j}. According to the same authors (*op. cit.*: 58) the empirical Baye's estimate for β_{0j} can then be considered to be $\hat{\beta}_{0j}^{EB} = \lambda_j \hat{\beta}_{0j} + (1-\lambda_j)\hat{\gamma}_{00}$, where $\hat{\beta}_{0j}^{EB}$ is the Bayesian estimate, $\hat{\beta}_{0j}$ is the Ordinary Least Squares prediction of the mean for school j, and $\hat{\gamma}_{00}$ is the mean predicted from the total number of students in the data base. The λ weight in the aforementioned

formula represents the reliability of the mean of school j and is given by the same authors (*op. cit.*) to be $\lambda = \dfrac{\tau_0^2}{\tau_0^2 + \sigma^2 / n_j}$.

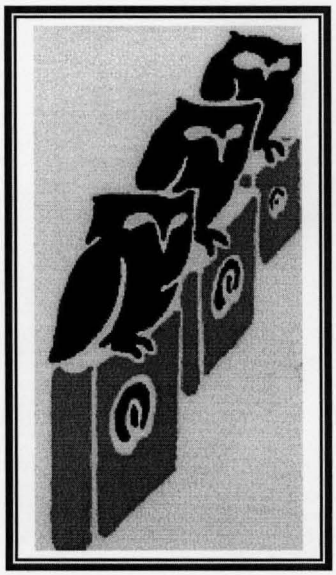
Finally, the standard error of $\hat{\beta}_{0j}^{EB}$ is given by Snijders & Bosker, (1999: 61) to be $\mathrm{SE}(\hat{\beta}_{0j}^{EB}) = \dfrac{1}{\sqrt{\tau_0^{-2} + n_j \sigma^{-2}}}$.

7.3. THE QUESTIONNAIRES

7.3.1. Student questionnaire 2000

Confidential Questionnaire

For *Lyceum* Students



Directions for the completion of this questionnaire

Dear students,

This questionnaire is confidential. The information that you will provide will be extremely useful for the study of your opinions. Please take part in this study.

Most of the questions in this questionnaire ask you to circle a number in a scale. Other questions ask for a brief answer. In each case you will find *guidelines in italics*. For your answers use the special spaces provided.

If you need any further guidelines, ask either your teacher or me. There are no correct or incorect answers. However, if you change your mind, simply cross out the 'wrong' choice and circle the 'right' one. Please answer all the questions.

Statistical Information

A1. Your initials: *Put your initials in the boxes* (please use only initials of given names)

⮜ the initial of your **surname**	The initial of your **first name** ⮜	**father's name** initial ⮜	**mother's name** initial ⮜

A2. Date of birth: *(day – month– year)*

A3. Programme of studies: *(circle)* ➢

1	2	3
Theoretical	Positive	Technological

A4. Your class: *(write)* ➢ (4)

A5. Your sex: *(circle)* ➢

1	2
Boy	Girl

A6. Did you attend the same *lyceum* last year? *(circle)* ➢

1	2
Yes	No

A7. Which *gymnasio* did you attend? *(write)* ➢ (7)

A8. How do you commute to your school every day? *(circle)* ➢

1	2
Public transport	On foot or by bicucle

A9. Do you have access to computer in your house? *(circle)* ➢

1	2
Yes	No

Frontisterion and plans for the future

A10. Do you attend a frontisterion? *(circle)* ➢	1 Yes	2 No	*(10)*
A11. If you attend a frontisterion write its name.			*(11)*
A12. Do you take private tuition at home? *(circle)* ➢	1 Yes	2 No	*(12)*
A13. Which form of tertiary education are you most likely to attend after lyceum? write the name of the department) ➢			*(13)*
A14. What other things do you do after school? *(put up to three× in the corresponding boxes)* ➢	Foreign language ❑	Sports ❑	Music ❑	*(14)*

Family information

A15. How many people under 21 years of age live in your house? (yourself included) *(put the number on the box)*➢		*(15)*

A16. You live with:
Circle a number from (1) to (4).

• Two natural paretns	1	*(16)*
• one natural parent (mother or father)	2	
• one natural and one non-natural parent (step mother of step father)	3	
• others (adopting family, relatives etc.)	4	

17. Does your family live in their own house? *(circle)* ➢	1 Yes	2 No	*(17)*
18. Is there a room in your house where you can study quietly? *(circle)* ➢	1 Yes	2 No	*(18)*

Your parents' occupations and education

Use the followng 11 cards in order to categorise the occupation of your paretns

1 (II)
ower-grade professionals,
dministrators and
fficials,
ducation, police etc

2 (II)
Managers in small industrial establishments (State or private), supervisors of non-manual workers

3
Not working

4 (VII)
Agricultural and other worker in primary production

5 (VIIa)
Semiskilled manual workers (not in primary production)

6 (VI)
Skilled manual workers

7
Technicians, supervisors or other workers or lower-grade technicians

8 ($\approx$ I)
Higher-grade professionals or technicians; managers in large industrial establishments

9 (IVb)
Small proprietors, own business self-employed, artisans *without employees*

10 ($\approx$ IVc)
Small holders, small proprietors, own business self-employed *with employees*

11
'Functionaries', doctors lowers university teachers or large proprietors

A19. Describe your father's occupation
(write) ➘

Card number (1-11) ➤

A20. Describe your mother's occupation
(write) ➘

Card number (1-11) ➤

Use the following seven cards in order to categorise the education of your parents.

1
Some classes in Primary School

2
Primary School

3
Some classes in Secondary Education

4
Secondary Education (lyceum)

5
Polytechnic

6
University

7
Post -graduate studies

A21. Describe your father's education
(write) ➘

Card number (1-7) ➤

A22. Describe your mother's education
(write) ➘

Card number (1-7) ➤

Your Opinion about School

Answering space (circle here) ⮟

1. Do your like your school building?

1	2	3	4
very much	*quite a lot*	*a little*	*not at all*

1 2 3 4 (β1)

2. If you could choose, would you rather change your school for another state one?

1	2	3	4
definitely	*perhaps yes*	*perhaps no*	*definitely not*

1 2 3 4 (β2)

3. If you have circled (1) or (2) in the previous question, what is the main reason why you would rather change your school? (write here⮟)

4. How satisfied are you from the discipline in your school?

1	2	3	4
very satisfied	*quite satisfied enough*	*not very satisfied*	*not satisfied at all*

1 2 3 4 (β4)

5. How satisfied are you with the condition of your classroom?

1	2	3	4
very satisfied	*quite satisfied enough*	*not very satisfied*	*not satisfied at all*

1 2 3 4 (β5)

6. Are there in your school any areas or places that for some reason you avoid?

1	2	3	4
there are no such places	*there is one such place*	*there are two or three such places*	*there are more than three such places*

1 2 3 4 (β6)

Your Opinion About Subject Learning

Answering space (circle here)

7. In how many subjects do you regard yourself as being a good student?

1	2	3	4
none	*in a few subjects*	*in most subjects*	*in every subject*

1 2 3 4 (β7)

8. In how many subjects do you manage to be adequately prepared for the day?

1	2	3	4
none	*in a few subjects*	*in most subjects*	*in every subject*

1 2 3 4 (β8)

9. How often do you answer questions addressed to you from your teachers in the class?

1	2	3	4
all the time	*very often*	*now and then*	*never*

1 2 3 4 (β9)

10. How often do you study the next day's lessons so as to be able to help your teachers during their lectures?

1	2	3	4
always	*very often*	*now and then*	*never*

1 2 3 4 (β10)

11. Do your find teaching hours boring or interesting?

1	2	3	4
they are all boring	*most of them are boring*	*most of them are interesting*	*they are all interesting*

1 2 3 4 (β11)

12. What is your estimation of the number of times you will be absent by the end of this school year?

1	2	3	4
so many that I will nearly miss the whole year	*a good nmber of absences*	*very few absences*	*not a single absence*

1 2 3 4 (β12)

Relations with Teachers

Answering space (circle here)

13. When you have worked hard, do your teachers reward you with good grades?

1	2	3	4	1 2 3 4
always	*in most he cases*	*not often*	*almost never*	(β13)

14. How often do you choose not to tell your teachers that you haven't understood something because you fear that they will make you feel like a fool?

1	2	3	4	1 2 3 4
very often	*often*	*in very few cases*	*never*	(β14)

15. Are there teachers who you consider to be good friends of yours?

1	2	3	4	1 2 3 4
no, there isn't anyone	*yes, there is at least one*	*yes there are some*	*yes, I regard most of them as friends*	(β15)

16. How often do you discuss personal problems with your teachers?

1	2	3	4	1 2 3 4
never	*scarcely ever*	*often*	*very often*	(β16)

17. How often are teachers helping you to grasp the 'content of learning'?

1	2	3	4	1 2 3 4
always	*very often*	*scarcely ever*	*never*	(β17)

18. Do teachers care for the things that you say during their classes?

1	2	3	4	1 2 3 4
allways	*very often*	*scarcely*	*never*	(β18)

19. Regardless of your level of attainment, how would you describe the <u>feedback</u> that you receive from your teachers?

1	2	3	4	1 2 3 4
very important	*quite important*	*not important enough*	*completely unimportant*	(β19)

Answering space (circle here)

20. Do your teachers discriminate between students in the class?

1	2	3	4	
all the teachers discriminate	*most of the teachers discriminate*	*most of the teachers do not discriminate*	*non of the teacher discriminate*	1 2 3 4 (β20)

21. How many of your teachers make their lesson pleasant?

1	2	3	4	
all of them	*most of them*	*few of them*	*none of them*	1 2 3 4 (β21)

Subjects That Arise in the School

22. How satisfied are you as regards the information that you receive from your teachers about <u>your life after finishing school</u>?

1	2	3	4	
very satisfied	*quite satisfied*	*not very satisfied*	*very disatisfied*	1 2 3 4 (β22)

23. How satisfied are your as regards the information that you receive from your teachers about <u>the minorities that live in our country</u>?

1	2	3	4	
very satisfied	*quite satisfied*	*not very satisfied*	*very disatisfied*	1 2 3 4 (β23)

24. How satisfied are you as regards the information that you receive from your teachers about <u>sexually transmitted diseases (AIDS)</u>?

1	2	3	4	
very satisfied	*quite satisfied*	*not very satisfied*	*very disatisfied*	1 2 3 4 (β24)

25. How satisfied are you as regards the information that you receive from your teachers about <u>drugs</u>?

1	2	3	4	
very satisfied	*quite satisfied*	*not very satisfied*	*very disatisfied*	1 2 3 4 (β25)

You and your Schoolmates

Answering space (circle here)

26. How easy or difficult do you find it to ask your classmates' help, when you have difficulties in the lesson of the day?

1	2	3	4	1 2 3 4
very easy	*relatively easy*	*relatively difficult*	*very difficult*	(β26)

27. How often do some of your schoolmates belittle you in public?

1	2	3	4	1 2 3 4
continually	*often*	*occassionally*	*never*	(β27)

28. How often do you belittle your schoolmates in public?

1	2	3	4	1 2 3 4
continualy	*often*	*occassionaly*	*never*	(β28)

29. Would you agree or disagree with the opinion that in your school there are groups of students who shouldn't be at your school at all?

1	2	3	4	1 2 3 4
absolutely agree	*agree*	*disagree*	*absolutely disagree*	(β29)

30. How easy or difficult do you find it to make friends among your schoolmates?

1	2	3	4	1 2 3 4
very easy	*quite easy*	*quite difficult*	*very difficult*	(β30)

31. How often do you try to flatter your teachers so as to achieve better grades?

1	2	3	4	1 2 3 4
continually	*often*	*occassionally*	*never*	(β31)

The School and your Parents or guardians

Answering space (circle here)

32. How satisfied are you with the quality of communication between your parents or guardians and the teachers of the school?

1	2	3	4
very satisfied	*quite satisfied*	*not satisfied enough*	*not satisfied at all*

1 2 3 4
(β32)

33. How satisfied are you with the quality of the discussions that you have with your parents or guardians regarding your progress at school?

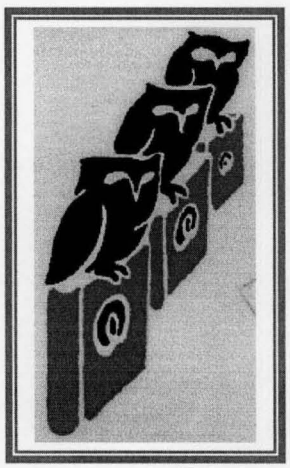
1	2	3	4
very satisfied	*quite satisfied*	*not satisfied enough*	*not satisfied at all*

1 2 3 4
(β33)

34. Thank you for your contribution. If you want to add anything that was not asked in this questionnaire but you think should have been asked, please use the space below to write your opinion.

7.3.2. Teacher questionnaire 2000

Teachers Confidential Questionnaire



Dear Colleagues,

This questionnaire is confidential and its completion a matter of your own free will. With its completion, you will be participating in an academic study that aims at the investigation of your own opinion. Personal data as well as the name of your schools will not be asked for. You can complete the questionnaire at school, during your long break. Most questions ask you to simply put a mark in a scale. Please find some time between teaching sessions to contribute to the study.

1. Agreement and Communication.

each of the following sentences you will find phrase that is derlined. On the right side you will find a six-number scale (from 3' to '+3' missing zero). Use this scale in order to show the egree to which the meaning of the verb applies in your case. **In this school this year:**	doesn't apply at all	applies to an infinitesimal degree	applies to a small degree	applies to a good degree	applies to a high degree	applies to a very high degree
Your colleagues care about the smooth operation of the school as whole and not only about their classes.	– 3	– 2	– 1	+ 1	+ 2	+ 3
Your colleagues make every endeavour to agree among emselves.	– 3	– 2	– 1	+ 1	+ 2	+ 3
New teachers in the school are acquainted with their duties in an ganized way.	– 3	– 2	– 1	+ 1	+ 2	+ 3
The sessions of the schoolteachers' union have produced gnificant results.	– 3	– 2	– 1	+ 1	+ 2	+ 3
Your colleagues advise you about how to deal successfully with e difficulties in your educational work.	– 3	– 2	– 1	+ 1	+ 2	+ 3
The discussions that you open with your colleagues at school ten centre on teaching and learning issues.	– 3	– 2	– 1	+ 1	+ 2	+ 3
The smooth and effective operation of the schools is regarded by ur colleagues as being more important than their personal rsuits.	– 3	– 2	– 1	+ 1	+ 2	+ 3
In general, everybody in this school accepts everybody else with eir good and bad points.	– 3	– 2	– 1	+ 1	+ 2	+ 3
Unanimity in unofficial discussions between teachers is frequent.	– 3	– 2	– 1	+ 1	+ 2	+ 3
. In this school you can count on your colleagues' support even issues that do not concern part of their work.	– 3	– 2	– 1	+ 1	+ 2	+ 3
. Most of your colleagues share the same views as you on the rpose of schooling.	– 3	– 2	– 1	+ 1	+ 2	+ 3
. You fit in well with your colleagues.	– 3	– 2	– 1	+ 1	+ 2	+ 3
. This school is like a big family: everybody is friendly and rdial	– 3	– 2	– 1	+ 1	+ 2	+ 3

2. The Directorship.

'he Directorship is a factor that is undoubtedly associated with the educational work. Please put a grade from 5 to 20 in the scales that follow, in order to show how much the meaning of the underlined verb phrase pplies.

This school year the director:	circle a number here					
5. Has provided support in your daily 'educational work'.	15	16	17	18	19	20
6. Has kept the teachers' union informed about the latest and most mportant issues.	15	16	17	18	19	20
7. Has proposed initiatives for the improvement of the life in life.	15	16	17	18	19	20
8. Has understood teachers' idiosyncrasies.	15	16	17	18	19	20
9. Has laid emphasis on the observance of the rules set by the lucational authorities (laws and regulations).	15	16	17	18	19	20

3. The Teaching Profession.

each of the following sentences you will find phrase that is derlined. On the right side you will find a six-number scale (from 3' to '+3' missing zero). Use this scale in order to show the egree to which the meaning of the verb applies in your case.

How much do the following apply for you in this school year?	**doesn't apply at all**	**applies to an infinitesimal degree**	**applies to a small degree**	**applies to a good degree**	**applies to a high degree**	**applies to a very high degree**
0. As a teacher you are satisfied with the level of your alary.	– 3	– 2	– 1	+ 1	+ 2	+ 3
1. As a teacher you are satisfied with the ethical rewards hat you receive.	– 3	– 2	– 1	+ 1	+ 2	+ 3
2. As a teacher you are satisfied with your living standards.	– 3	– 2	– 1	+ 1	+ 2	+ 3
3. You have enjoyed teaching this year.	– 3	– 2	– 1	+ 1	+ 2	+ 3
4. The teaching profession is exciting.	– 3	– 2	– 1	+ 1	+ 2	+ 3
5. You would rather do another job – not in the field of education.	– 3	– 2	– 1	+ 1	+ 2	+ 3
6. People who you consider important in your life appreciate the aching profession.	– 3	– 2	– 1	+ 1	+ 2	+ 3
7. You provide an ideal type of education.	– 3	– 2	– 1	+ 1	+ 2	+ 3
8. Commuting from your home to school everyday is stressful.	– 3	– 2	– 1	+ 1	+ 2	+ 3
9. Your opinion is being heard in the centres where educational olicy is being planned.	– 3	– 2	– 1	+ 1	+ 2	+ 3
0. Public opinion understands the difficulties of the teaching rofession.	– 3	– 2	– 1	+ 1	+ 2	+ 3

4. Designing and carrying out the 'educational work'.

each of the following clauses you will find a verb phrase that is derlined. On the right side you will find again a six-number scale om '-3' to '+3' missing out zero). Use this scale in order to show w difficult it is to achieve what the underlined phrase means.

How easy or difficult is it for you personally:	**extremely difficult**	**very difficult**	**quite difficult**	**quite easy**	**very easy**	**extremely easy**
. To use books, exercises and teaching material that you believe are necessary for your students.	– 3	– 2	– 1	+ 1	+ 2	+ 3
. To choose educational methodology and teaching techniques that you believe are best for your students.	– 3	– 2	– 1	+ 1	+ 2	+ 3
. To keep discipline in the classroom.	– 3	– 2	– 1	+ 1	+ 2	+ 3
. To decide about the quantity of the homework that you should assign to your students.	– 3	– 2	– 1	+ 1	+ 2	+ 3

each of the following clauses you will find a verb that is derlined. On the right side you will find a six-number scale (from 3' to '+3' missing out zero). Use this scale in order to show the gree to which the meaning of the verb applies in your case.

How much have the following applied to you during this school year?	**doesn't apply at all**	**applies to an infinitesimal degree**	**applies to a small degree**	**applies to a good degree**	**applies to a high degree**	**applies to a very high degree**
. The students easily learn the things that you are trying to teach.	– 3	– 2	– 1	+ 1	+ 2	+ 3
. Your students' attitudes and behaviour reduce their chances for ccess in the subjects that you teach.	– 3	– 2	– 1	+ 1	+ 2	+ 3
. Disorderly student behaviour interferes with the quality of your aching.	– 3	– 2	– 1	+ 1	+ 2	+ 3
. The students lack interest in the subjects that you teach.	– 3	– 2	– 1	+ 1	+ 2	+ 3

. **What subject do you teach this year?**

Second grade: .....

Third grade: .....

. **If you have any comment about the areas that were covered in this questionnaire or if you believe that mething important has been left out, use the space below for your suggestions.** ⩛

.....

.....

.....

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.....

7.3.3. Student questionnaire 1999 (pilot work)

Questionnaire code

Lyceum

PCQ

PUPILS' CONFIDENTIAL QUESTIONNAIRE

Part one. 29 questions. Required time: 10 minutes

Dear friends,
This questionnaire is confidential and its purpose is the study of learning conditions at home and at school. There are no 'correct' or 'wrong' answers. Please answer all questions honestly, without missing any.

PLEASE FILL THIS SECTION WITH BLOCK CAPITALS

1. Your initials — *Put in the boxes on the right your*
1. *name*
2. *surname*
3. *father's name*
4. *mother's name*

(please use Christian names)

1	*2*	*3*	*4*

(1)

2. Date of birth *(year, month, day)* _____ *(2)*

3. Today's date *(year, month, day)* _____ *(3)*

4. Your school's name *(write)* _____ *(4)*

5. 'Direction' of studies *(circle)* ➢

1	2	3
Humanities	Sciences	Technological

(5)

6. Your class *(write)* ➢ _____ (6)

7.Gender *(cyrcle)* ➢

1	2
Boy	Girl

8. Did you attend the same lyceum last year? *(circle)* ➢

1	2
Yes	No

(7)

9. Which Gymnasio did you attend? *(write)* ➢ _____ *(8)*

10. Which Primary School did you attend? *(write)* ➢ _____ *(9)*

(10)

SECTION B: FRONTISTERION AND PLANS FOR THE FUTURE

11. Do you attend a frontisterion?	1	2	(11)
(circle) ➢	yes	no	
12. Do you take private tuition?	1	2	(12)
(circle) ➢	yes	no	
13. If you attend classes in Frontisterion, write its name			(13)
14. Which tertiary establishment are you planning to attend? (write the name of the establishment, even if you change your mind next year) ➢			(14)

SECTION C: YOUR FAMILY

15. How many people under 21 live in your house? *(use the box on the right for the answer)* ➢ (15) ____

16. You live with:

circle a number from (1) to (6). (16)

- Both natural parents 1
- One natural parent (mother or father) 2
- one natural and one non-natural parent (step mother or step father) 3
- two adopting parents 4
- one adopting parent (mother or father) 5
- relatives 6

17. Does your family own the house where they live? *(circle)* ➢	1 yes	2 no	(17)
18. Does your family own any other house? *(circle)* ➢	1 yes	2 no	(18)
19. Do you study in your own room? *(cyrcle)* ➢	1 yes	2 no	(19)

SECTION D: YOUR PARENTS' PROFESSION AND EDUCATION

Eleven profession cards.

1 (II)
ower-grade professionals,
dministrators and
fficials,
ducation, police, etc

2 (II)
Managers in small industrial establishments (state or private), supervisors of non-manual employers

3
Not working

4 (VII)
Agricultural and other workers in primary production

5 (VIIa)
Semiskilled manual worker (not in primary production)

6 (VI)
Skilled manual worker

7
Technician, supervisor or other workers or lower-grade technicians

8 (≈ I)
Higher-grade professional or technician; manager in large industrial establishments.

9 (IVb)
Small proprietor, own business, self-employed, artisan *without employees*

10 (≈ IVc)
Small holder, small proprietor, own business self employed *with employees*

11
'Functionnaire', doctor assistant university teacher or large proprietor

Answer here
(use the boxes)
⮟

20. your father's work

Description ⮟ Card number *(1-11)* ➢ *(20)*

(write)

21. Your mother's work

Description ⮟ *Card number (1-11)* ➢ *(21)*

(write)

Eight education cards

1
Some classes in the Primary School

2
Primary School

3
Some classes in the Secondary Education

4
Secondary Education (Lyceum)

5
Polytechnic

6
University

7
Post graduate Studies

8
Fine Arts and Music

22. Your father's education

Description ⮟ *Card number (1-8)* ➢ *(22)*

(write)

23. Your mother's education

Description ⮟ *Card number (1-8)* ➢ *(23)*

(write)

SECTION D′: PERSONAL INFORMATION

24. Do you work?	1 yes	2 no	*(24)*
25. Do you study at a private Conservatory?	1 yes	2 no	*(25)*
26. Do you walk to school every day ?	1 yes	2 no	*(26)*
27. Is there a computer in your house?	1 yes	2 no	*(27)*
28. What amount of money do you spend each day during a typical week in the term? (write)➢	……*Gr. Drachmas.*		*(28)*

End of part one. Thank you for your help.

Code number

PCQ

Lyceum

PUPILS' CONFIDENTIAL QUESTIONNAIRE

Second Part: 40 Questions. Available Time: 30 minutes.

Dear Friends

ıis is the second part of the confidential questionnaire. Please do not leave any question unanswered. The data ıt will be collected will be used strictly for research purposes and will not become known publicly.

DIRECTIONS FOR COMPLETION

. **Read each question carefully, together with its four possible answers.**

'. Decide which of the four answers you will give.

'. **In the right margin of the page, under the sign 'special answering place', circle the number that corresponds to your answer.**

'. Circle clearly. If you make a mistake, write 'error' and circle another answer.

EXAMPLE

0. Do you enjoy going to the theatre?

1	2	3	4
always enjoy going to he theatre.	*I enjoy going to the theatre some times.*	*I don't really like going to the theatre.*	*I never enjoy going to the theatre.*

Special answering place (Please circle)

1 2 3 4
(0)

				Special answering place (Please circle)
. Going to school				
1 *always like school.*	2 *I usually like school.*	3 *I hardly ever like school.*	4 *I never like school.*	1 2 3 4 (1)
. Getting on with other pupils at school				
1 *always get on well with thers in my year.*	2 *I usually get on well with others in my year.*	3 *I hardly ever get on well with others in my year.*	4 *I never get on well with others in my year.*	1 2 3 4 (2)
.Getting on with teachers				
1 *always get on well with eachers.*	2 *I usually get on well with teachers.*	3 *I hardly ever get on well with teachers.*	4 *I never get on well with teachers.*	1 2 3 4 (3)
. In the playground				
1 *always feel safe in the layground.*	2 *I usually feel safe in the playground.*	3 *I hardly ever feel safe in the playground.*	4 *I never feel safe in the playground.*	1 2 3 4 (4)
. The way teachers treat me				
1 *eachers are always fair.*	2 *Teachers are usually fair.*	3 *Teachers are hardly ever fair.*	4 *Teachers are never fair.*	1 2 3 4 (5)
. Is the playground of your school clean?				
1 *he playground is always lean.*	2 *The playground is clean most of the time.*	3 *The playground is rather dirty.*	4 *The playground is always dirty.*	1 2 3 4 (6)
'. Teachers' praise				
1 *eachers always praise ie when I have worked ard.*	2 *Teachers usually praise me when I have worked hard.*	3 Teachers hardly ever praise me, even when I have worked hard.	4 *Teachers never praise me, even when I have worked hard.*	1 2 3 4 (7)

				Special answering place (Please circle) ▼
. Asking for help.				
1 *very day I ask teachers or help if I am stuck.*	2 *Several times a week I ask teachers for help if I am stuck.*	3 *I hardly ever ask teachers for help, even if I am stuck.*	4 *I never ask teachers for help, even if I am stuck.*	1 2 3 4 (8)
. The usefulness of the homework				
1 *lmost all homework is seful.*	2 *Some of the homework is useful.*	3 *Very little of the homework is useful.*	4 *Almost all the homework is useless.*	1 2 3 4 (9)
0. The classes in the "Frontisterion".				
1 *he classes at frontisterion' are much etter than those at chool. It is on the former hat I base my hopes for uture academic success.*	2 *The classes at the 'frontisterion' are better than those at school but not much better.*	3 *The classes at school are better than those at 'frontisterion' but not much better.*	4 *The classes at school are better than those at 'frontisterion' to such a degree that I wonder why there are students who attend 'frontisterion'.*	1 2 3 4 (10)
1. People at home.				
1 *t home they never care bout how I am getting on t school.*	2 *At home sometimes they care about how I am getting on at school*	3 *At home they often care about how I am getting on at school. Especially when I get my grades.*	4 *At home they always care about how I am getting on at school This is discussed daily.*	1 2 3 4 (11)
2. Being successful.				
1 *always get to do omething I'm good at.*	2 *I usually get to do something I'm good at.*	3 *I hardly ever get to do something I'm good at.*	4 *I never get to do something I'm good at.*	1 2 3 4 (12)
3. How often do you discuss your classes with your parents?				
1 *discuss classes with my arents daily..*	2 I discuss my classes with my parents several times a week.	3 I hardly ever discuss my classes with my parents.	4 I never discuss my classes with my parents.	1 2 3 4 (13)

				Special answering place (Please circle) ⩛
4. Do you finish your homework?				
1 *always finish my homework.*	2 *I finish my homework most of the time.*	3 *Sometimes I finish my homework.*	4 *I hardly ever finish my homework.*	1 2 3 4 (14)
5. If you don't do your homework				
1 *Teachers never notice if I haven't done my homework.*	2 *If I haven't done my homework teachers hardly ever notice.*	3 *If I haven't done my homework teachers usually notice.*	4 *If I haven't done my homework teachers always notice.*	1 2 3 4 (15)
6. Difficulty of schoolwork.				
1 *Almost all schoolwork is difficult.*	2 *Much of the schoolwork is difficult.*	3 *Little of the schoolwork is difficult.*	4 *I have never seen difficult schoolwork.*	1 2 3 4 (16)
7. Self-confidence				
1 *I always have confidence in myself.*	2 *I usually have confidence in myself.*	3 *I hardly ever have confidence in myself.*	4 *I never have confidence in myself.*	1 2 3 4 (17)
8. The work at school				
1 *Is always boring.*	2 *Is boring most of the time.*	3 *Is interesting most of the time.*	4 *Is always interesting.*	1 2 3 4 (18)
9. Completing your schoolwork.				
1 *Every day I find it difficult to complete my schoolwork.*	2 *Twice or three times a week I find it difficult to complete my schoolwork.*	3 *Once or twice a month I find it difficult to complete my schoolwork.*	4 *I never find it difficult to complete my schoolwork.*	1 2 3 4 (19)
10. Teachers' help.				
1 *Teachers always help me to understand my work.*	2 *Teachers usually help me to understand my work.*	3 *Teachers hardly ever help me to understand my work.*	4 *Teachers never help me to understand my work.*	1 2 3 4 (20)

				Special answering place (Please circle) ▼
1. Your 'contribution' to the class.				
1 *hardly ever answer uestions in the class.*	2 *Some times during the day I answer questions in the class.*	3 *In almost every class I answer questions.*	4 *In every class I answer many questions.*	1 2 3 4 (21)
2. Teachers listening				
1 *eachers always listen to vhat I say.*	2 *Teachers usually listen to what I say.*	3 *Teachers hardly ever listen to what I say.*	4 *Teachers never listen to what I say.*	1 2 3 4 (22)
3. (29) What teachers think about my work.				
1 *ll teachers think my vork in class is good.*	2 *Most teachers think my work in class is good.*	3 *Only a few of my teachers think my work in class is good.*	4 *None of my teachers thinks my work in class is good.*	1 2 3 4 (23)
4. (12) Easiness of work.				
1 *Ay work is always too asy for me..*	2 *My work is usually too easy for me.*	3 *My work is usually about right for me.*	4 *My work is always right for me.*	1 2 3 4 (24)
5. (13) Thinking for yourself.				
1 *eachers never ncourage me to think for ıyself.*	2 *Teachers hardly ever encourage me to think for myself.*	3 *Teachers usually encourage me to think for myself.*	4 *Teachers always encourage me to think for myself.*	1 2 3 4 (25)
6. Teachers keeping you informed about your work.				
1 *eachers always keep me nformed about the qual- ty of my work.*	2 *Teachers keep me in- formed about the quality of my work at school but think that I would need some more information.*	3 *I do not get much infor- mation from teachers about the quality of my work.*	4 *I do not get information about the quality of my work at school from my teachers.*	1 2 3 4 (26)

				Special answering place (Please circle)
27. (15) Teachers' help.				
1 *Teachers never help me when I am stuck.*	2 *Teachers hardly ever help me when I am stuck.*	3 *Teachers usually help me when I am stuck.*	4 *Teachers always help me when I am stuck.*	1 2 3 4 (27)
28. Your 'presence' in the class compared with that of your classmates.				
1 *I believe that my 'presence' is very good.*	2 *I believe that my 'presence' is good enough.*	3 *I believe that my 'presence' is rather bad.*	4 *I believe that my 'presence' is very bad.*	1 2 3 4 (28)
29. (20) Being successful				
1 *I never get to do something I'm good at.*	2 *I hardly ever get to do something I'm good at.*	3 *I usually get to do something I'm good at.*	4 *I always get to do something I'm good at.*	1 2 3 4 (29)
30. (28) Your ability.				
1 *I think I am very clever (more than the others)*	2 *I think I am quite clever*	3 *I think I'm not very clever.*	4 *I think that I'm not clever at all.*	1 2 3 4 (30)
31. Your teachers about your "presence" in the class.				
1 All the teachers believe that my "presence" in the classes is good.	2 Most of the teachers believe that my "presence" in the classes is good.	3 A few teachers believe that my "presence" in the classes is good.	4 Almost none of the teachers believes that my "presence" in the classes is good.	1 2 3 4 (31)
32. (30) Joining in.				
1 *I never feel left out of things.*	2 *I hardly ever feel left out of things.*	3 *I usually feel left out of things.*	4 *I always feel left out of things.*	1 2 3 4 **(32)**
33. Playing truant. Remember that no one you know will see your answer.				
1 *I never play truant.*	2 *I think that finally I will have missed 1 to 4 school days.*	3 *I think that finally I will have missed about a school week.*	4 *I think that I will reach or even exceed the Ministry-set limit.*	1 2 3 4 (33)

Special answering place (Please circle)

34. (35) The way others behave.

1	2	3	4	
There is bad behaviour in my classes daily.	*During the week there are 2 or 3 incidents of bad behaviour in my classes.*	*Hardly ever is there bad behaviour in my classes.*	*There is never bad behaviour in my classes.*	1 2 3 4 (34)

35. (36) Making friends.

1	2	3	4	
I find it easy to make friends.	*I usually find it easy to make friends.*	*I usually find it hard to make friends.*	*I always find it hard to make friends.*	1 2 3 4 (35)

36. Your behaviour in class towards your classmates –your view.

1	2	3	4	
My behaviour is always bad.	*My behaviour is mostly bad.*	*My behaviour is mostly good.*	*My behaviour is always good.*	1 2 3 4 (36)

37. Your behaviour in class towards your teachers –your view.

1	2	3	4	
My behaviour is always bad.	*My behaviour is mostly bad.*	*My behaviour is mostly good.*	*My behaviour is always good.*	1 2 3 4 (37)

38. (39) Your behaviour at home – your view.

1	2	3	4	
My behaviour is always bad.	*My behaviour is mostly bad.*	*My behaviour is mostly good.*	*My behaviour is always good.*	1 2 3 4 (38)

39. (40) Your behaviour at home – parents' view.

1	2	3	4	
My behaviour is always bad.	*My behaviour is mostly bad.*	*My behaviour is mostly good.*	*My behaviour is always good.*	1 2 3 4 (39)

40. Teachers' help with your plans for the future (job prospectives, education etc.)

1	2	3	4	
I know exactly what I want to do and I am indebted to my teachers for that.	*Teachers are an important source of information for making plans about my future.*	*Teachers are a source of information for making plans about my future, but not the most important source.*	*Teachers are not a source of information for making plans about my future.*	1 2 3 4 (40)

THANK YOU VERY MUCH FOR YOUR HELP

7.3.4. Teacher questionnaire 1999 (pilot work)

questionnaire code

TCQ

TEACHERS' CONFIDENTIAL QUESTIONNAIRE

55 questions.Completion time: about 15′ minutes.

Dear colleagues,

This questionnaire is confidential and has been specially designed to investigate your opinions about the work in the school. Your answers will be associated with those of the pupils and useful conclusions will be drawn from them. Please answer to all the questions sincerely.

PERSONAL DATA

1. The name of your school: *(1)*

2. Specialisation Number *(2)*

3. Subject: *(3)*

4. Year of Graduation: *(4)*

5. Other subjects that you teach in this school: *(5)*

6.Year of Birth: *(6)*

7.Today's date: *(year, month, day)* *(7)*

8. What is your sex?: *(circle)* 1 male 2 female *(8)*

You have six numbers at your disposal: three for the 'difficult' category and three for the 'easy' category. Circle the number that best represents your opinion. **How easy or difficult is it for you:**	*extremely difficult*	*very enough*	*rather difficult*	*rather easy*	*very enough*	*extremely easy*	
9. To decide about the books and other instructional material?	– 3	– 2	– 1	+ 1	+ 2	+ 3	*(9)*
10. To select teaching techniques?	– 3	– 2	– 1	+ 1	+ 2	+ 3	*(10)*
11. To discipline students?	– 3	– 2	– 1	+ 1	+ 2	+ 3	*(11)*
12. To determine the amount of homework to be assigned?	– 3	– 2	– 1	+ 1	+ 2	+ 3	*(12)*

You have six numbers at your disposal: three for the 'disagree' category and three for the 'agree' category. Circle the number that best represents your opinion. **In this school this year:**	*strongly disagree*	*disagree*	*disagree more than agree*	*agree more than disagree*	*agree*	*strongly agree*	
13. Many students learn what I am trying to teach.	– 3	– 2	– 1	+ 1	+ 2	+ 3	*(13)*
14. Attitudes that students bring from 'outside' reduce their chances for future academic success.	– 3	– 2	– 1	+ 1	+ 2	+ 3	*(14)*
15. The level of student misbehaviour in this school (noise, smoking, fighting, absenteeism etc.) interferes seriously with my teaching.	– 3	– 2	– 1	+ 1	+ 2	+ 3	*(15)*
16. The lack of collaboration and interest from most students in the classes interferes seriously with my teaching.	– 3	– 2	– 1	+ 1	+ 2	+ 3	*(16)*

17. Compare the academic ability of the students you have taught since the beginning of the current school year to the average for the school. What percentage of your students have been above the school average? *(write the percentage in the box)* ➤ **%** *(17)*

SECTION B: COLLABORATION AND COMMUNICATION

You have six numbers at your disposal: three for the 'disagree' category and three for the 'agree' category. Circle the number that best represents your opinion.

In this school this year:

	strongly disagree	*disagree*	*disagree more than agree*	*agree more than disagree*	*agree*	*strongly agree*	
18. Colleagues care about the problems of the school as a whole and not only for their own work.	– 3	– 2	– 1	+ 1	+ 2	+ 3	*(18)*
19. There is a great deal of cooperative effort in educational and administrative issues.	– 3	– 2	– 1	+ 1	+ 2	+ 3	*(19)*
20. New staff (either teaching or secretarial) is being informed by other colleagues in a systematic and friendly way.	– 3	– 2	– 1	+ 1	+ 2	+ 3	*(20)*
21. The regular official discussions between the teachers are useful.	– 3	– 2	– 1	+ 1	+ 2	+ 3	*(21)*
22. Colleagues in the school give advice so as to enhance teaching and help to deal with difficulties.	– 3	– 2	– 1	+ 1	+ 2	+ 3	*(22)*
23. Discussions between the staff often touch on important teaching and learning issues.	– 3	– 2	– 1	+ 1	+ 2	+ 3	*(23)*
24. The benefit of the whole school is above teachers' personal concerns.	– 3	– 2	– 1	+ 1	+ 2	+ 3	*(24)*
25. Everybody is accepted the others with all their good and bad points.	– 3	– 2	– 1	+ 1	+ 2	+ 3	*(25)*
26. In the regular official meetings teachers usually agree.	– 3	– 2	– 1	+ 1	+ 2	+ 3	*(26)*
27. You can count on most staff members to help out anywhere, anytime - even though it may not be part of their official assignment.	– 3	– 2	– 1	+ 1	+ 2	+ 3	*(27)*
28. Most of my colleagues share my beliefs and values about what the central aims of the school should be.	– 3	– 2	– 1	+ 1	+ 2	+ 3	*(28)*
29. I feel accepted and respected as a colleague by most staff members.	– 3	– 2	– 1	+ 1	+ 2	+ 3	*(29)*
30. This school seems like a big family; everyone is so close and cordial.	– 3	– 2	– 1	+ 1	+ 2	+ 3	*(30)*

SECTION C: SCHOOL ADMINISTRATION (EFFECTIVENESS–RESPONSE)

You have six numbers at your disposal: three for the 'disagree' category and three for the 'agree' category. Circle the number that best represents your opinion.

In this school this year:

	strongly disagree	*disagree*	*disagree more than agree*	*agree more than disagree*	*agree*	*strongly agree*	
31. I have the feeling that the administration 'knows its job'.	– 3	– 2	– 1	+ 1	+ 2	+ 3	*(31)*
32. The administration knows what kind of school it wants and communicates it to the staff.	– 3	– 2	– 1	+ 1	+ 2	+ 3	*(32)*
33. The administration lets staff members know what is expected of them.	– 3	– 2	– 1	+ 1	+ 2	+ 3	*(33)*

Read carefully the following propositions and answer by circling one of the numbers on the right hand side of the page.

Put your answer here (circle)

34. The administration ..... in securing extra courses for the school.

1	*2*	*3*	*4*	
does a very poor job	*does a rather poor job*	*does a rather good job*	*does a very good job*	1 2 3 4 *(34)*

35. The administration deals ..... with persons and situations that interfere with your educational work (pressure from parents, 'consultants' etc).

1	*2*	*3*	*4*	
ineffectively	*rather ineffectively*	*rather effectively*	*effectively*	1 2 3 4 *(35)*

36. To what extent does the administration of this school help you improve your teaching or solve an instructional or class arrangement problem

1	*2*	*3*	*4*	
very little	*relatively little*	relatively much	very much	1 2 3 4 *(36)*

37. To what extent does the administration of this knows the problems faced by the staff?

1	*2*	*3*	*4*	
very little	*relatively little*	relatively much	very much	1 2 3 4 *(37)*

38. To what extent the school administration behaviour toward the staff is supportive and encouraging?

1	*2*	*3*	*4*	
very little	*relatively little*	relatively much	very much	1 2 3 4 *(38)*

Read carefully the following propositions and answer by circling one of the numbers on the right hand side of the page.

39. How often do you feel satisfied with your job?

1	*2*	*3*	*4*	1 2 3 4
almost never	*sometimes*	*often*	*always*	*(39)*

40. How often do you feel that you offer the right type of education?

1	*2*	*3*	*4*	1 2 3 4
almost never	*sometimes*	*often*	*always*	*(40)*

How often do you agree with the following propositions?	never	very rarely	not so often	often	very often	always	***Put your answer above (circle)***
41. 'I have enjoyed teaching this year'.	– 3	– 2	– 1	+ 1	+ 2	+ 3	*(41)*
42. 'I think that teaching is not a waste of time'.	– 3	– 2	– 1	+ 1	+ 2	+ 3	*(42)*
43. 'I am a very effective teacher'.	– 3	– 2	– 1	+ 1	+ 2	+ 3	*(43)*

You have six numbers at your disposal: three for the 'dissatisfied' category and three for the 'satisfied' category. Circle the number that best represents your opinion. **Questions**	*extremely displeased*	*displeased*	*rather displeased*	*rather pleased*	*pleased*	*extremely pleased*	
44. How satisfied are you with the level of your fee?	– 3	– 2	– 1	+ 1	+ 2	+ 3	*(44)*
45. If you consider everything that comprises your educational work (teaching, designing, commuting, working time etc) how satisfied are you with your work?	– 3	– 2	– 1	+ 1	+ 2	+ 3	*(45)*
46. If you consider your educational work, on the one hand, and your economic and social situation, on the other, how happy are you with your life?	– 3	– 2	– 1	+ 1	+ 2	+ 3	*(46)*

SECTION E: SUPPLEMENTARY PERSONAL INFORMATION

Put your answer in the boxes below

47. For how many school years (September to June) have you been working in this school? (Don't count this one) (47)

48. If you are employed as a permanent teacher in the school, which year were you appointed? (48)

49. If you are not a permanent teacher, for how many months have you been working as a supply-teacher? (49)

50. How many minutes does it take to commute from your house to school in a typical school day? (50)

Put your answer here (circle one or more numbers)

51. What means of transport do you use to communicate to school under normal circumstances? *(you can circle from one to all the three numbers)*

1	*2*	*3*
by car or motorcycle	*by public transport*	*on foot*

1 2 3 (51)

52. Have you ever worked as: *(you can circle anything from none to all of the four numbers)*

1	*2*	*3*	*4*
School Consultant	*Director of the Local Education Authority*	*School Director*	*Deputy School Director*

1 2 3 4 (52)

53. Have you ever attend one or more of the following forms of in-service training? *(you an cycle from none to all of the three numbers)*

1	*2*	*3*
SELME	*PEK*	*Other form*

1 2 3 (53)

54. Do you have any other university egree(s)
lease specify under the (a)and (b)

(a)

(b)

1 2 (54)

55. How many years of 'Frontisterion' experience do you have? (55)

THANK YOU VERY MUCH FOR YOUR HELP

DAMAGED TEXT IN ORIGINAL